# ECM group

November 17, 2005

Peter Van Alyea
Redwood Oil Company
455 Yolanda Ave., Suite 200
Santa Rosa, CA 95404

Re: Revised FS/CAP
7716 Old Redwood Highway
Cotati, CA

Dear Mr. Van Alyea:

ECM Group has prepared this revised Feasibility Study/Corrective Action Plan (FS/CAP) for above referenced site (Figures 1 and 2, Appendix A). A Corrective Action Plan (CAP) was prepared for the site in April 1998.[1] A CAP addendum was prepared in November 1999.[2] As requested in a letter dated July 6, 2005 from the Sonoma County Department of Health Services, this revised FS/CAP includes: all additional data collected since the 1998 CAP; updated estimates of soil and groundwater contamination; and a new feasibility study. All site data for soil is included in Tables 1 through 3 (Appendix B). All site data for groundwater is included in Tables 4 through 6 (Appendix B). Locations of all investigative borings and monitoring wells, and current station configuration is shown on Figure 2 (Appendix A). Station configuration prior to station remodeling in 2000, and sampling locations from the 1999 UST removal, are shown in Figure 3 (Appendix A). Sampling locations from the 1999 on-site soil characterization study are shown on Figure 4 (Appendix A). Excavation Boundaries and sampling locations from the 2000 remedial soil overexcavation are shown on Figure 5 (Appendix A). Updated estimates of contaminant mass in soil and groundwater are provided in Calculations 1 and 2 (Appendix B).

---

1 SES, 1998, Corrective Action Plan, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, Sierra Environmental Services, April 13, 1998, 29 pages and 6 appendices.

2 ECM, 1999, Corrective Action Plan Addendum, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, November 16, 1999, 8 pages and 5 appendices.

**SITE HISTORY**

The following site history was obtained from Redwood Oil Company files and ECM project files. The station property and operations were purchased by Redwood Oil Company on January 1, 1979 from Mr. John Gantner. The history of the station prior to 1979 is not available for inclusion in this report. The piping at the station was replaced in 1981 when the station was remodeled.

In January 1990, new product lines and tank overspill protectors were installed at the site. Samples were collected from the soil generated during the renovation. Hydrocarbons as gasoline and BTEX were detected in seven soil samples at concentrations up to 5,700 parts per million (ppm) and 430 ppm, respectively.[3] Sonoma County Department of Health Services (SCDHS) personnel were present during the renovations and subsequently filed an underground Storage Tank Authorization Petroleum Release Report.[4]

A soil vapor survey was completed at the site on November 13 and 14, 1990.[5] Up to 580 ppm and 390 ppm volatile hydrocarbons were detected, approximately 3 ft below ground surface (bgs), near the pump islands and the underground fuel tanks, respectively.

On September 18, 19, and 20, 1991, Soils Exploration Services of Vacaville, California installed three onsite monitoring wells (MW-1, MW-2, and MW-3).[6] The monitoring well locations are

---

3 NET Pacific, Inc., 1990, Laboratory Analytic Report Log No. 9343, for Redwood Oil Company, Santa Rosa, California, January 18, 1990, 3 pages.

4 Sonoma County Environmental Health Department, 1990, Unauthorized Petroleum Release Report filed by Alex Schneider, SCEHD, for 7716 Old Redwood Highway, Cotati, California, January 12, 1990, 1 page.

5 Earthtec, Itd., 1991, Consultants Phase I Environmental Assessment, 7716 Old Redwood Highway, Cotati, California, prepared for Redwood Oil Company, February 11,1991, 4 pages and 1 appendix.

6 Sierra Environmental Services, 1992, Subsurface Investigation Report, 7716 Old Redwood Highway, Cotati, California, prepared for Redwood Oil Company, January 16, 1991, 16 pages and 5 appendices.

shown on Figure 2 (Appendix A). Analytic results for soil are included in Table 3 (Appendix B).

On April 20, 1992, Sierra Environmental Service (SES) personnel visited the site to sample an off-site domestic well located east of the site in a vacant lot.[7] An attempt was made to sample this well. The well was gauged to a depth of 180 feet below grade, but water was reportedly not present in the well.

On October 14 and 15, 1993, SES conducted a subsurface investigation at this site.[8] Thirteen soil borings were installed (G-1 through G-13). Ground water samples were collected from the borings. Shallow ground water was encountered in the borings at approximately eight ft bgs. Analytic results for ground water are included in Tables 5 and 6 (Appendix B). Analytic results for soil from G-5 and G-6 are included in Table 3 (Appendix B).

Free-phase petroleum hydrocarbons were detected in on-site monitoring well MW-1 on March 28, 1996. A product line leak was detected on July 9, 1996 by Petroleum Maintenance Company (PMC) personnel and the product line was subsequently shut down pending line repairs. The product line leak was repaired on August 15, 1996 by PMC. Free-phase petroleum hydrocarbons were detected in on-site monitoring well MW-2 on September 26, 1996. SES installed passive product skimmers in monitoring wells MW-1 and MW-2 on October 8, 1996.

On February 9, 1998, SES conducted an additional subsurface investigation in order to further define the extent of hydrocarbons in soil and ground water in off-site areas to the northeast of the site.[9] Two borings (G-14 and G-15) were installed (Figure 2 Appendix A). Analytic results for

---

7 1992, Sierra Environmental Services, Site Update Letter, 7716 Old Redwood Highway, Cotati, California, prepared for Robert Swift, Sonoma County Health Department, June 25, 1992, 1 page.

8 Sierra Environmental Services, 1993, Subsurface Investigation Report, 7716 Old Redwood Highway, Cotati, California, prepared for Redwood Oil Company, November, 19, 1993, 8 pages and 4 appendices.

9 SES, 1998, Corrective Action Plan, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, Sierra Environmental Services, April 13, 1998, 29 pages and 6 appendices.

ground water are included in Tables 5 and 6 (Appendix B). Analytic results for soil are included in Table 1 (Appendix B).

**UST Excavation And Remedial Soil Overexcavation**

A Corrective Action Plan (CAP) was prepared for the site in April 1998.[10] A CAP addendum was prepared in November 1999.[11] On June 25, 1999, four USTs were removed from the site.[12] The former UST pit was excavated to a depth of 13 ft bgs. Soil sampling data from the UST excavation is tabulated in Table 1 (Appendix B). Soil sampling locations are shown in Figure 3 (Appendix A).

In October 1999, in preparation for a remedial soil overexcavation, 15 soil borings (B-1 through B-15) were installed at the site. Boring locations are shown in Figure 4 (Appendix A). Laboratory analytical results are tabulated in Table 1 (Appendix B). Boring results are summarized in the November, 1999 CAP Addendum. Excavation limits were proposed in the CAP Addendum based on analytical results from B-1 through B-15. Proposed excavation limits are shown on Figure 4, Appendix A.

In January and March 2000, approximately 2,200 cubic yards of soil impacted with petroleum hydrocarbons were excavated from the site.[13] Laboratory analytical results are tabulated in Table 2 (Appendix B). Soil sampling locations and excavation boundaries are shown in Figure 5

---

10 SES, 1998, Corrective Action Plan, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, Sierra Environmental Services, April 13, 1998, 29 pages and 6 appendices.

11 ECM, 1999, Corrective Action Plan Addendum, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, November 16, 1999, 8 pages and 5 appendices.

12 ECM, 1999, UST Removal Summary Report, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, August 10, 1999, 4 pages and 3 appendices.

13 ECM, 2000, Remedial Soil Excavation Report, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, April, 3, 2000, 4 pages and 3 appendices.

(Appendix A). Soil from the area labeled 'New UST Excavation' was excavated to a depth of 18 ft bgs. Soil from the remainder of the excavation was excavated to a depth of 8 ft bgs.

Monitoring wells MW-1 and MW-2 were destroyed due to remedial excavation activities at the site. On March 20, 2001, two onsite monitoring wells (MW-1A and MW-2A) were installed at the site (Figure 2, Appendix A). The wells serve to replace monitoring wells MW-1 and MW-2.[14]

**Investigative Activities Since the 2000 Remedial Overexcavation**

On April 19, 2000, ECM installed two soil borings (G-16 and G-17) and one monitoring well (MW-4) at the site (Figure 2, Appendix A).[15] On October 16, 2002, two additional monitoring wells (MW-5 and MW-6) and one CPT boring (CPT-1) were installed at the site (Figure 3, Appendix A).[16] On October 16 and 17, 2003, one off-site and two on-site CPT borings (CPT-2 through CPT-4) were installed at the site (Figure 2, Appendix A).

Four monitoring wells (MW-7A, MW-7B, MW-8A, and MW-8B) were installed in April, 2005 to investigate the vertical extent of impacts at the site. MW-7A and MW-8A were screened between approximately 45 ft and 55 ft bgs. MW-7B and MW-8B were screened between approximately 65 ft and 75 ft bgs. Well construction details, with exact screen intervals, are presented in Table 4 (Appendix B). Laboratory analytical results are tabulated in Tables 5 and 6 (Appendix B).

---

14 ECM, 2001, Well Installation Report, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, May 24, 2001, 11 pages and 5 appendices.

15 ECM, 2000, Subsurface Investigation Report, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, June 13, 2000, 11 pages and 5 appendices.

16 ECM, 2002, Subsurface Investigation Report, Redwood Oil Service Station, 7716 Old Redwood Highway, Cotati, California, December 12, 2002, 12 pages and 7 appendices.

Site wells are currently monitored on a quarterly and semi-annual basis. Historic ground water level data is included in Table 4 (Appendix B). Analytical data for soil samples collected from MW-5 and MW-6 is included in Table 3 (Appendix B). Cumulative analytical data for groundwater is included in Tables 5 and 6, (Appendix B).

The Shell Service Station located across Old Redwood Highway from the site (Figure 2, Appendix A) is also a hydrocarbon release site. Plumes from the two sites are comingled.

**Topographic and Geologic Setting**

The site is located in the southern portion of the Cotati Valley, in the city of Cotati, Sonoma County, California. Land uses on adjacent properties in the site vicinity are commercial, retail, and residential.

The surface elevation of the site is approximately 100 ft above mean sea level. The topographic gradient in the site vicinity slopes gently toward the north-northwest. The closest surface water is an intermittent creek which flows from southeast to northwest approximately 1,000 ft northeast of the site. The creek flows into Laguna de Santa Rosa. The depth to ground water at the site is generally 5 to 9 ft below grade.

Groundwater elevation maps for the past three years have been compiled in Appendix C. Groundwater flow direction is variable but is most often to the east and southeast. An examination of the groundwater elevation maps shows that groundwater flow at the site is complicated by the large quantities of backfilled gravel in the excavation pit on this site and on the Shell Service Station site adjacent to the site.

**CONCEPTUAL SITE MODEL**

The 2000 remedial excavation removed impacted soil to a depth of 8 ft bgs, the approximate depth to water at the time of the excavation. During the 1999 UST removal, soil from the former UST pit was excavated to a depth of 13 ft bgs. In the area where the new USTs were installed, soil was excavated to a depth of 18 ft bgs. (Figure 6, Appendix A). Sample results indicate that a substantial quantity of contaminated soil remains in the saturated zone. Based on sidewall samples from the excavation and on samples collected from beneath the dispenser islands during UST removal, it appears that a relatively small amount of impacted soil was left unexcavated in the unsaturated zone along the west side of the excavation. Figure 7 (Appendix A) shows excavation boundaries with respect to current station configuration.

An estimate of contaminant mass in soil is provided in Calculation 1 (Appendix B). Based on the assumptions outlined in Calculation 1, it is estimated that a contaminant mass of between 4,500 kg and 14,500 kg remains in site soil. Of this mass, most remains in the saturated zone.

Historical site data for groundwater is tabulated in Tables 5 and 6 (Appendix B). Trend graphs for gasoline and MTBE for MW-1/1A, MW-2/2A, and MW-3, for the time subsequent to the excavation, are provided in Graphs 1 through 6 (Appendix A). Trend graphs show a declining trend for gasoline and MTBE in MW-1A and MW-2A, both of which are located in the excavated zone. High concentrations of gasoline and MTBE remain in MW-3, which is located outside the excavated zone. Declining trends in MW-1A and MW-2A, combined with data from MW-3, indicate that the excavation removed soil which acted as a secondary source for groundwater contamination.

Data from recently-installed MW-7 and MW-8 document that significant impacts to groundwater extend vertically to the 55 ft - 65 ft bgs zone. Logs for the MW-7 and MW-8 indicate that there is no impermeable aquitard separating shallow groundwater from deeper groundwater. Soils

underlying the site are composed of low permeability formations interspersed with higher permeability formations, with hydrologic communication and connectivity between shallow groundwater and deeper groundwater (to a depth of 70 to 80 ft bgs). Depth to water in MW-7 and MW-8, screened at depths of approximately 45 to 55 ft bgs and 65 to 75 ft bgs, do not differ markedly from depth to water in existing wells MW-1 through MW-6.

An estimate of contaminant mass in groundwater is provided in Calculation 2 (Appendix B). Based on the assumptions outlined in Calculation 2, it is estimated that a contaminant mass of 32 kg is associated with the groundwater plume at this site.

**REVISED FEASIBILITY STUDY**

The CAP considered the following remedial options:

Soil Vapor extraction coupled with groundwater extraction and filtration.
Soil excavation coupled with groundwater extraction and filtration.
Soil excavation coupled with passive remediation.

The 1998 CAP recommended Option 2 (soil excavation coupled with groundwater extraction [GWE]) as the most technologically feasible and cost-effective remedial alternative for the site. Extensive excavation activities occurred in 2000. Since then, concentrations in onsite monitoring wells have declined for gasoline and MTBE in MW-1A and in MW-2A. (Graphs 1 through 6, Appendix A).

This feasibility study will examine the following alternatives for continued site remediation:

1.) Groundwater extraction

2.) Remediation by Natural Attenuation (RNA)
3.) Dual-Phase Extraction (DPE): i.e. removal of soil vapor and groundwater

**Option 1: Groundwater Extraction (GWE)**

GWE was described in the CAP and recommended as a follow-up to soil excavation. It has been noted by the Lawrence Livermore National Laboratory (LLNL) report, as well as by other sources, that GWE is ineffective as a clean-up method for petroleum hydrocarbons. However, GWE is effective at plume migration control. GWE would also prevent further vertical migration of contaminants to deeper zones.

**Option 2: Remediation by Natural Attenuation (RNA)**

RNA (or passive bioremediation) is also discussed in the CAP. To evaluate the probable success of RNA as a remedial technique, fate and transport modeling was performed using BIOSCREEN, a public domain contaminant modeling program published by the EPA.[17] Site model parameters for monitoring well locations, contaminant concentrations, soil density, permeability, porosity, hydraulic gradient, hydraulic conductivity, and others, were colleted from the site database or taken from reference values. The model predicts groundwater contaminant levels in groundwater versus distance from the site, using time projections. For the purpose of the modeling, concentrations from MW-3 (source area well) and MW-6 (most distant downgradient monitoring point) were used. Modeling Results, including a detailed summary of input parameters, are shown in Appendix D. Thirty and fifty year projections predict no significant additional decline in hydrocarbon concentrations in water in onsite wells, as hydrocarbons are gradually released from soil. Using the most likely degradation scenario, shape and size of the plume are predicted

[17] US EPA, 1997, BIOSCREEN, Groundwater Contamination Natural Attenuation Model, Version 1.4, a Public Domain Modeling Software

to expand somewhat over a fifty year period (i.e. concentrations in downgradient wells may be expected to rise somewhat over time).

**Option 3: Dual-Phase Extraction (DPE)**

A DPE system would consist of either: a high-vacuum blower which would extract groundwater and soil vapor simultaneously; or of a combination of pumps to extract groundwater, and a blower to extract soil vapor. In either case, since most of the remaining impacted soil at the site is in the saturated zone, groundwater extraction would lower the water table in order to make soil vapor extraction a viable option.

Prior to implementing this option, it would be necessary to conduct a pilot test. The pilot test would assess the viability of DPE as a remedial option. If DPE were selected as a remedial option, the pilot test would provide data which would be used in the construction of a DPE system.

**Costs of Options 1 through 3**

Costs for Option 2 would be limited to the costs of continued monitoring. Costs for Option 1 (GWE) and Option 2 (RNA) cannot be assessed until a pilot test has been completed. In general, costs for infrastructure and construction of a DPE or GWE system at a site of this size may run between $150,000 and $300,000, with annual operation and maintenance costs between $20,000 and $40,000 annually.

**Selection of Preferred Remedial Option**

Option 3 (DPE) has been tentatively selected as the most technologically feasible and cost effective remedial option at the site, pending the results of a DPE pilot test. RNA, or GWE as a

stand-alone measure, would not be likely to lower contaminant concentrations at the site in a timely manner. RNA would fail to prevent offsite migration of additional contaminants.

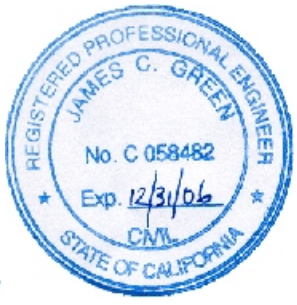
A DPE pilot test would require the installation of an extraction well. A mobile, high-vacuum DPE unit would be used to conduct the pilot test. A workplan for a DPE pilot test, including installation of the extraction well, will be submitted under separate cover. The DPE pilot test will also supply data to evaluate the use of GWE as a stand-alone technology. If the pilot test results show that DPE is not technologically feasible or cost effective, GWE may be reconsidered as a means of plume migration control.

Thank you for allowing ECM to provide environmental consulting services to Redwood Oil Company.



Sincerely,
ECM Group

David Hazard
Staff Scientist




Jim Green
Professional Engineer #C58482

Attachments: Appendix A - Figures
Appendix B - Tables, Graphs, and Calculations
Appendix C - Groundwater Elevation Contour Maps
Appendix D - BIOSCREEN Modeling Results

cc: Darcy Bering, SCDHS

# APPENDIX A
# FIGURES

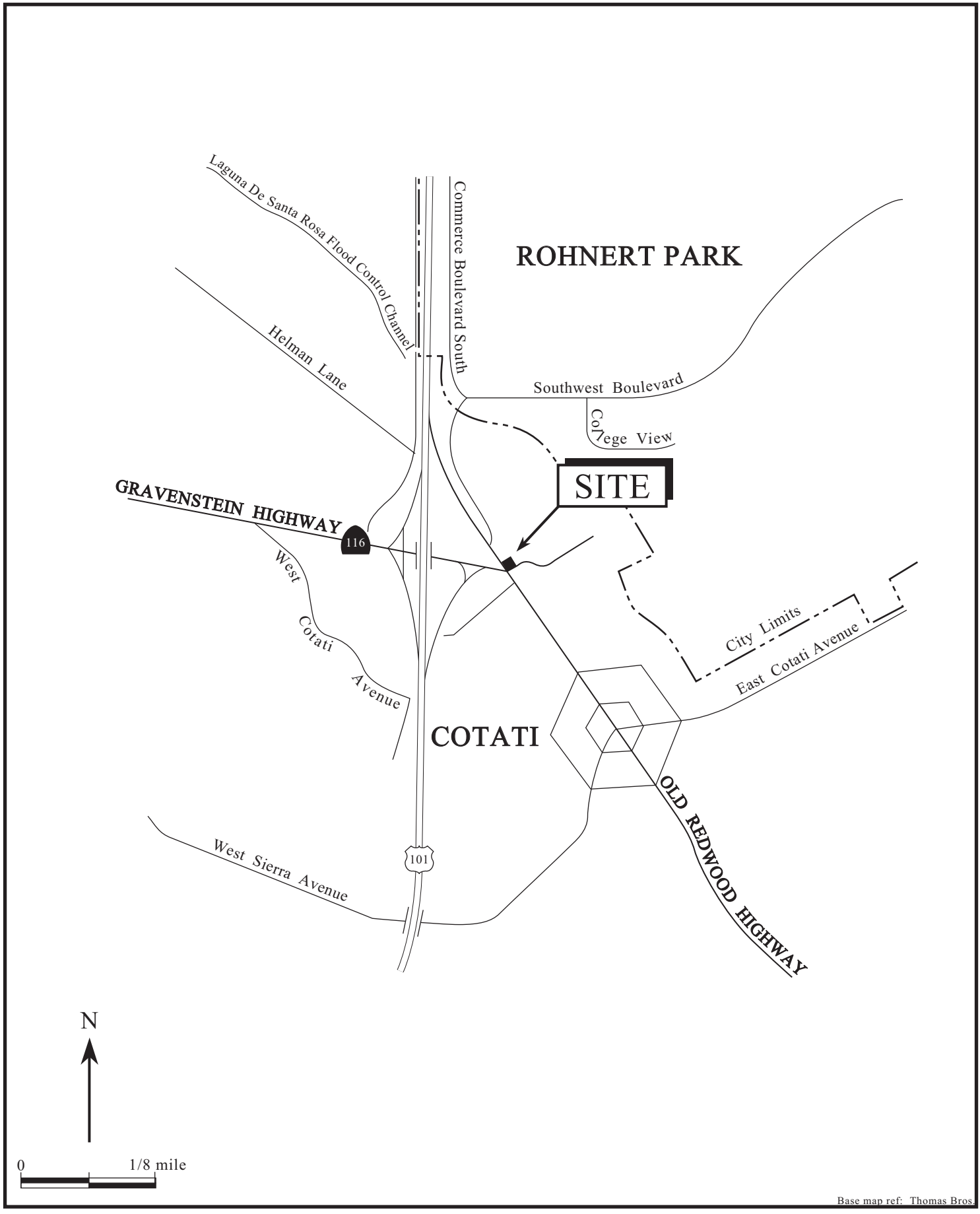



Figure 1. Site Location Map – Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

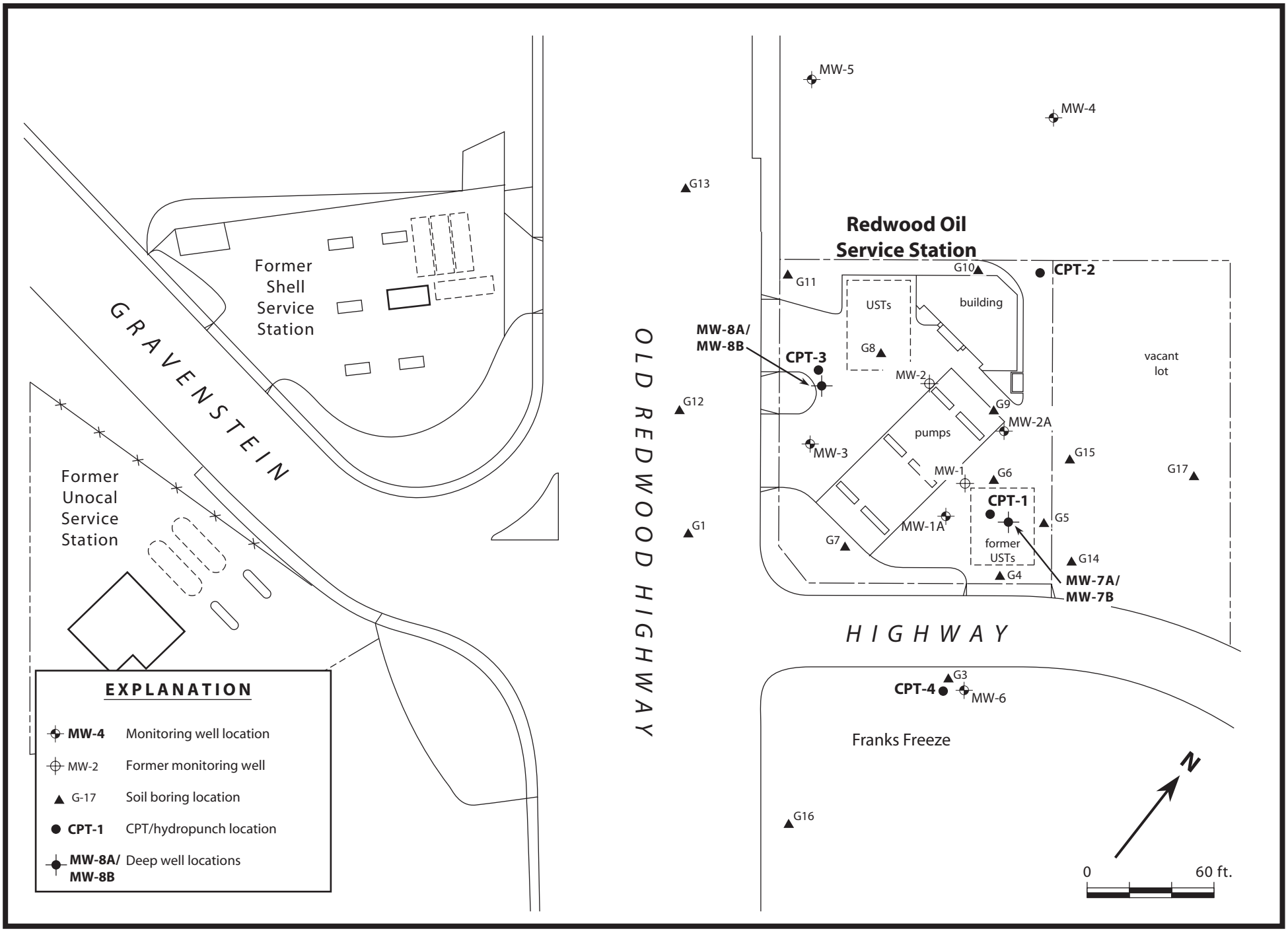



Figure 2. Monitoring Well, Soil Boring and CPT Locations - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-22 [fig. 2] 11/17/05

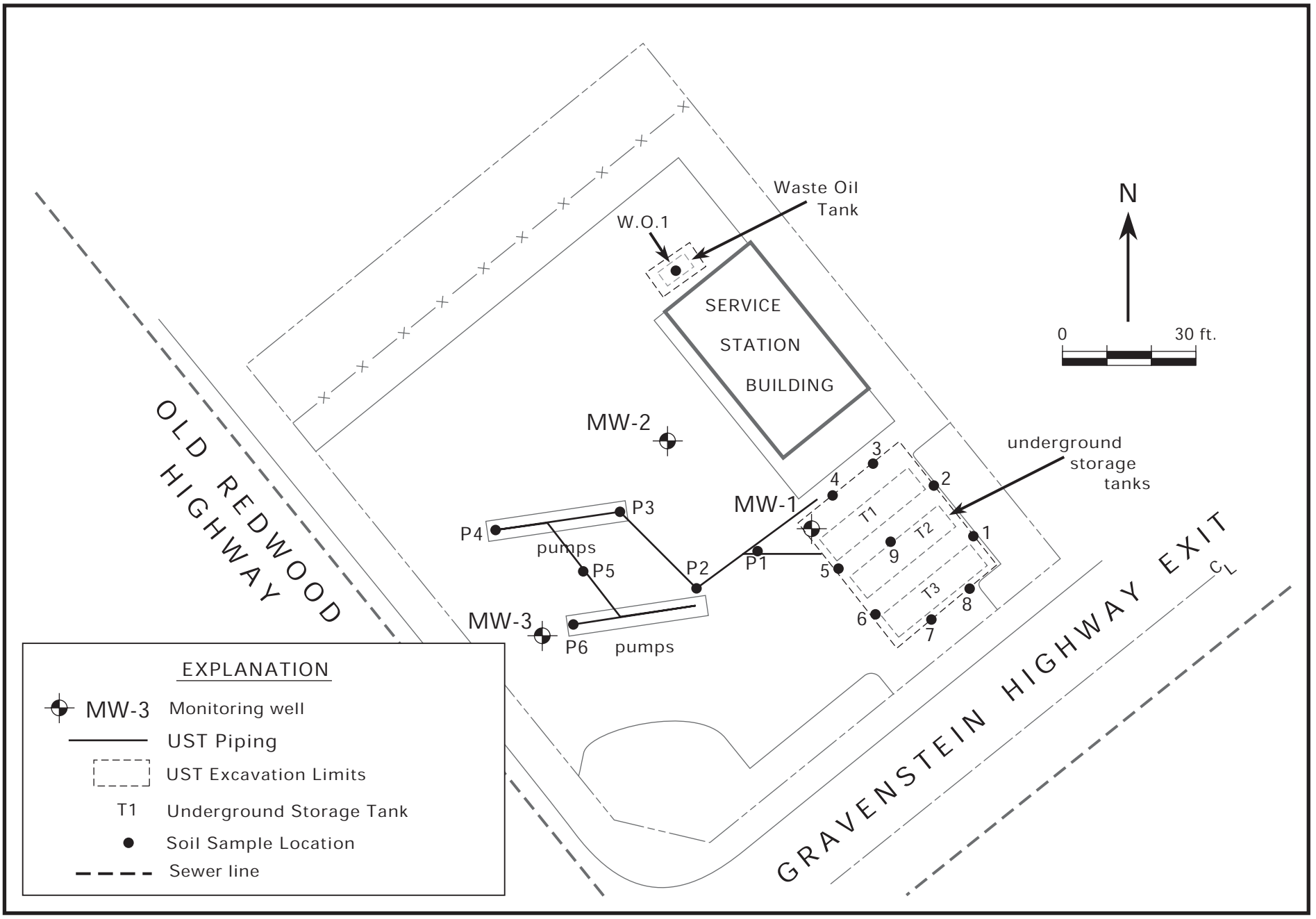



Figure 3. Underground Storage Tank Excavation – Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-03 [UST excavation] 7/2/99

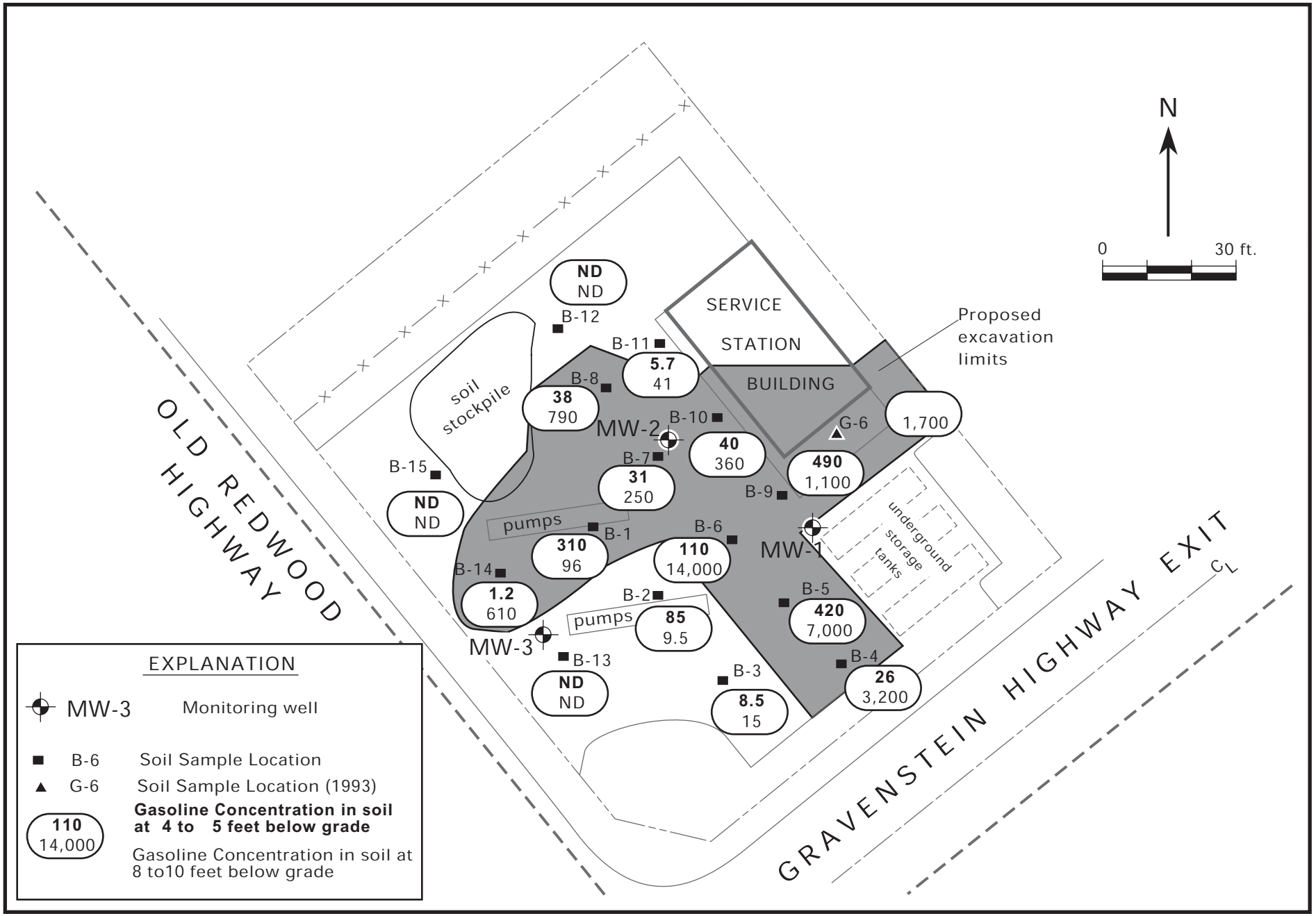



Figure 4. Gasoline Concentrations in Soil –October 28, 1999 – Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-22 [Figure 4] 11/17/05

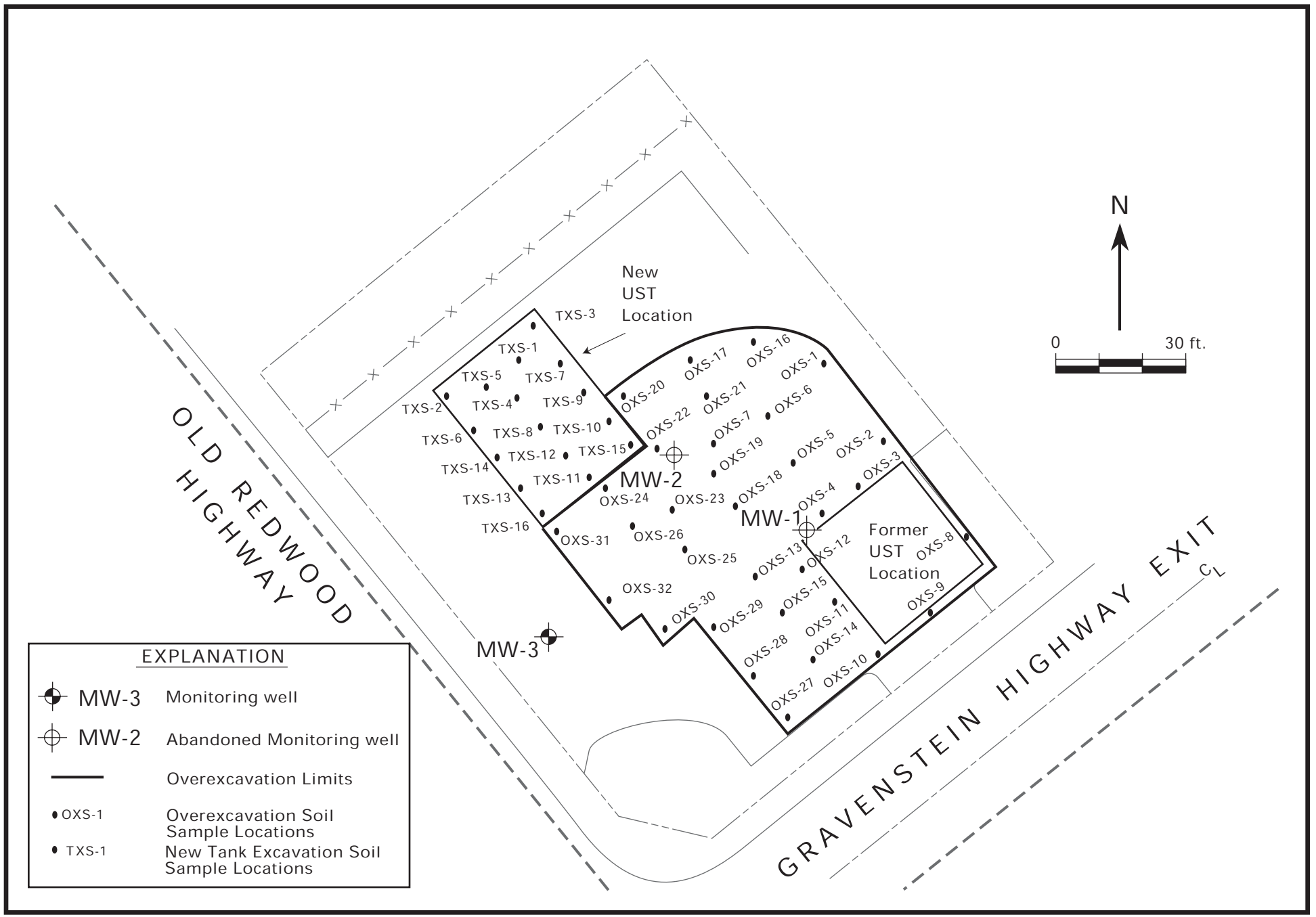



Figure 5. Overexcavation Limits and Sample Locations –January 27 & 28 , 2000 – Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-22 [Figure 5] 11/17/05

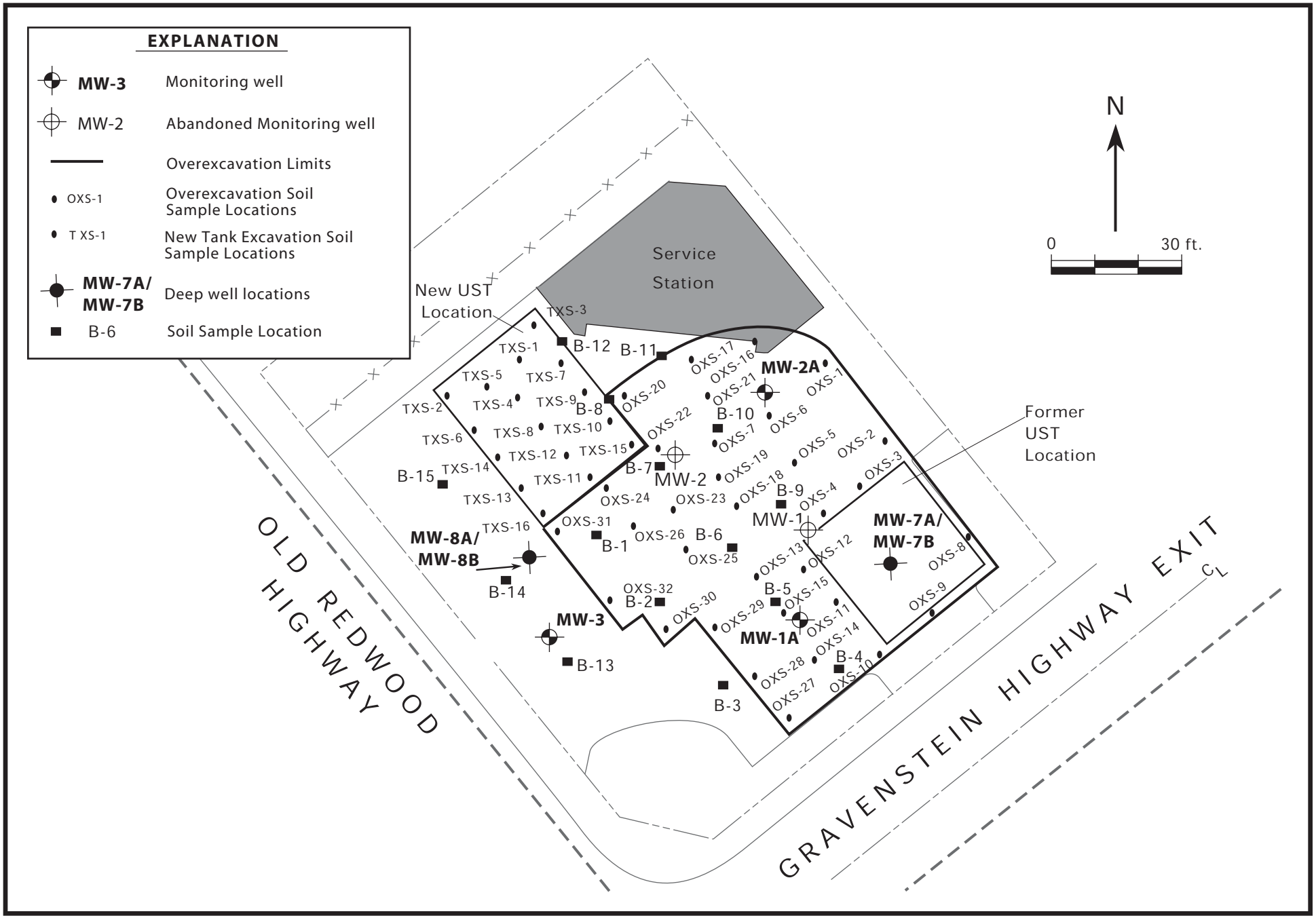



Figure 6. Overexcavation Limits and Sample Locations –January 27 & 28 , 2000 – Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-22 [Figure 6] 11/17/05

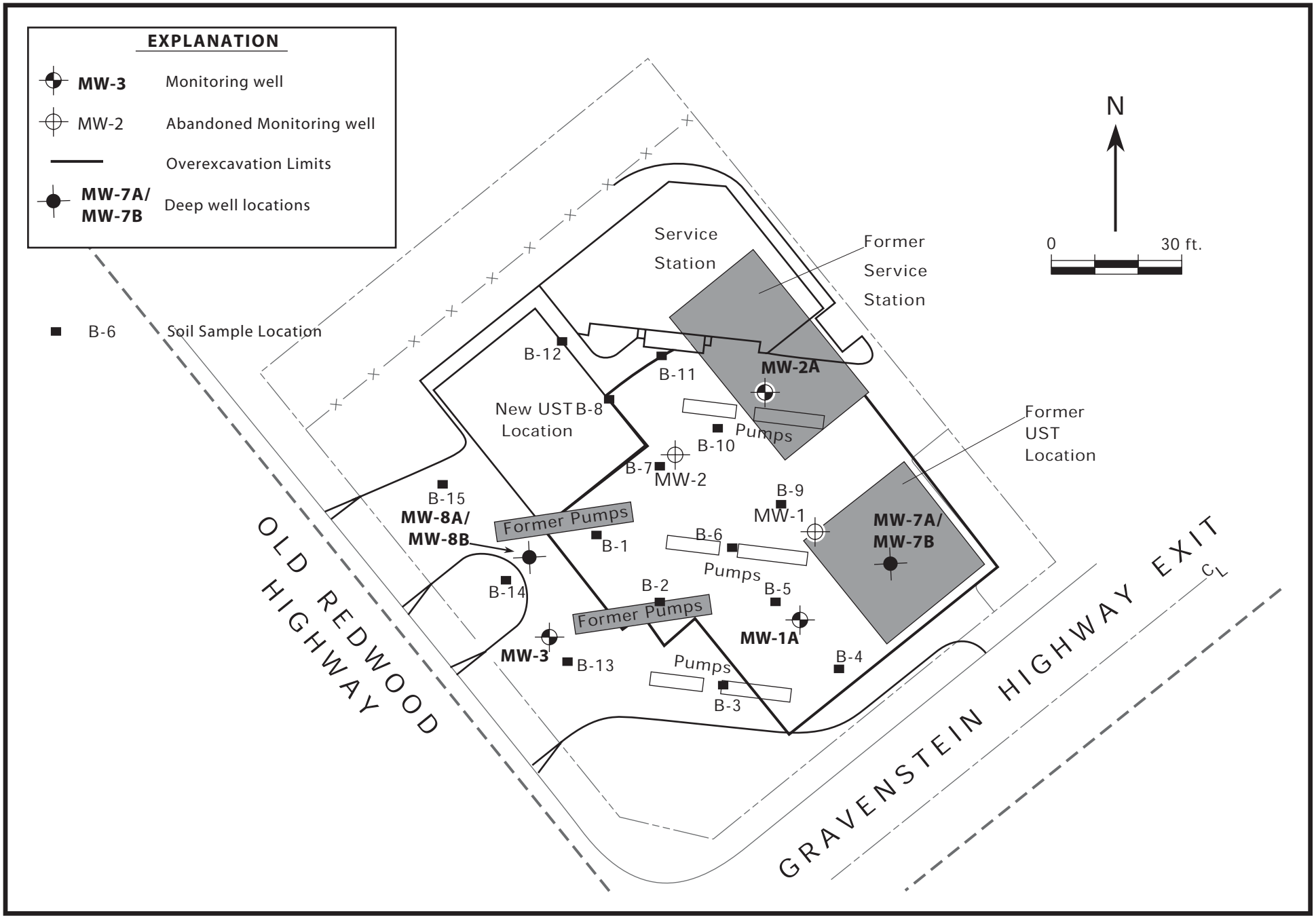



Figure 7. Overexcavation Limits and Sample Locations –January 27 & 28 , 2000 – Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-22 [Figure 7] 11/17/05

# APPENDIX B
# TABLES, GRAPHS, AND CALCULATIONS

Table 1. Analytical Results for Soil - UST Excavation, Waste Oil Tank and On-Site Soil Characterization - 7716 Old Redwood Highway, Cotati, California

| Sample ID | Sample Date | Sample Depth (in feet) | TPPH(G) | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE |
|---|---|---|---|---|---|---|---|---|
| | | | <---------- ppm ----------> | | | | | |
| 1 | 6/25/99 | 8 | 1,300 | 0.38 | 22 | 21 | 141 | 0.88 |
| 2 | 6/25/99 | 8 | 780 | 0.38 | 18 | 13 | 81 | 0.95 |
| 3 | 6/25/99 | 8 | 1,900 | 1.9 | 67 | 36 | 220 | 11 |
| 4 | 6/25/99 | 8 | 2,400 | 7.9 | 94 | 40 | 230 | 27 |
| 5 | 6/25/99 | 8 | 2,600 | 8.9 | 110 | 43 | 240 | 66 |
| 6 | 6/25/99 | 8 | 130 | 0.052 | 0.81 | 0.96 | 8.3 | 6.1 |
| 7 | 6/25/99 | 8 | 4,300 | 2.6 | 110 | 66 | 450 | 4.0 |
| 8 | 6/25/99 | 8 | 100 | 0.17 | 4.2 | 1.6 | 11 | 0.20 |
| 9 | 6/25/99 | 13 | 810 | 0.82 | 21 | 11 | 74 | 2.6 |
| P-1 | 6/29/99 | 2 | 330 | 0.73 | 8.4 | 1.3 | 26 | --- |
| P-2 | 6/29/99 | 2 | 66[1] | <0.125 | <0.125 | 0.31 | 0.44 | --- |
| P-3 | 6/29/99 | 2 | 1,700 | 1.2 | 0.76 | 6.2 | 38 | --- |
| P-4 | 6/29/99 | 2 | 6,600 | 6.0 | 86 | 39 | <2.5 | --- |
| P-5 | 6/29/99 | 2 | 110 | 0.21 | <0.125 | 1.5 | 3.1 | --- |
| P-6 | 6/29/99 | 2 | 2,500 | 2.2 | 4.1 | 18 | 83 | --- |

Explanation:

TPPH(G) - Total Purgeable Petroleum Hydrocarbons as Gasoline.
PPM - Parts Per Million
MTBE - Methyl-t-butyl ether

Notes:

[1] Results within Quantitation range; chromatographic pattern not typical of fuel.

Table 1. Analytical Results for Soil - UST Excavation, Waste Oil Tank and On-Site Soil Characterization - 7716 Old Redwood Highway, Cotati, California

| Sample ID | Sample Date | Sample Depth | TPH-G | TPH-D | TPH-MO | B | T | E | X | Cd | Cr | Pb | Ni | Zn | MTBE | 8010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | <---------- ppm ----------> | | | | | | | | | | | | | |
| WO | 6/25/99 | 6 feet | <1.0 | <1.0 | <10 | <0.005 | <0.005 | <0.005 | <0.005 | <5.0 | 13 | <5.0 | 25 | 18 | <0.005 | ND[1] |

Explanation:

TPH-G - Total Petroleum Hydrocarbons as Gasoline.
TPH-D - Total Petroleum Hydrocarbons as Diesel.
TPH-MO - Total Petroleum Hydrocarbons as Motor Oil.
B - Benzene
T - Toluene
E - Ethyl Benzene
X - Xylenes
Cd - Cadmium
Cr - Chromium
Pb - Lead
Ni - Nickel
Zn - Zinc
MTBE - Methy-t-butyl ether

Notes:

[1] Analyzed by EPA Method 8010 for Purgeable Halocarbons. No analytes were detected at a detection limit of 5.0 ppb.

Table 1. Analytical Results for Soil - UST Excavation, Waste Oil Tank and On-Site Soil Characterization - 7716 Old Redwood Highway, Cotati, California

| Sample ID | Sample Date | Sample Depth (in feet) | TPH-Gas | Benzene | Toluene | Ethyl Benzene | Xylenes |
|---|---|---|---|---|---|---|---|
| | | | <---------- PPM ----------> | | | | |
| B-1 | 10/28/99 | 4' | 310 | 1.8 | 6.8 | 7.8 | 46 |
| | 10/28/99 | 9' | 96 | 0.32 | 2.4 | 3.1 | 19 |
| B-2 | 10/28/99 | 4' | 85 | 1.3 | 0.96 | 1.5 | 8.2 |
| | 10/28/99 | 8' | 9.5 | 0.05 | 0.067 | 0.18 | 0.93 |
| B-3 | 10/28/99 | 4' | 8.5 | 0.14 | <0.0125 | 0.092 | 0.031 |
| | 10/28/99 | 9' | 15 | 0.23 | 0.20 | 0.27 | 1.1 |
| B-4 | 10/28/99 | 5' | 26 | 1.0 | 0.87 | 0.56 | 1.8 |
| | 10/28/99 | 10' | 3,200 | 28 | 190 | 69 | 390 |
| B-5 | 10/28/99 | 5' | 420 | 7.0 | 31 | 8.6 | 46 |
| | 10/28/99 | 10' | 7,000 | 53 | 480 | 150 | 890 |
| B-6 | 10/28/99 | 5' | 110 | 2.9 | 4.4 | 1.4 | 6.6 |
| | 10/28/99 | 10' | 14,000 | 110 | 1,100 | 300 | 1,800 |
| B-7 | 10/28/99 | 5' | 31 | 1.2 | 0.33 | 0.44 | 0.89 |
| | 10/28/99 | 10' | 250 | 2.8 | 15 | 4.2 | 26 |
| B-8 | 10/28/99 | 5' | 38 | 1.7 | 1.7 | 0.67 | 2.7 |
| | 10/28/99 | 10' | 790 | 8.5 | 45 | 13 | 81 |
| B-9 | 10/28/99 | 4' | 490 | 5.5 | 31 | 8.0 | 47 |
| | 10/28/99 | 8' | 1,100 | 11 | 61 | 17 | 110 |

Table 1. Analytical Results for Soil - UST Excavation, Waste Oil Tank and On-Site Soil Characterization - 7716 Old Redwood Highway, Cotati, California

| Sample ID | Sample Date | Sample Depth (in feet) | TPH-Gas | Benzene | Toluene | Ethyl Benzene | Xylenes |
|---|---|---|---|---|---|---|---|
| | | | <---------- PPM ----------> | | | | |
| B-10 | 10/28/99 | 4' | 40 | 0.28 | <0.001 | 0.68 | 2.9 |
| | 10/28/99 | 8' | 360 | 2.8 | 22 | 6.6 | 40 |
| B-11 | 10/28/99 | 4' | 5.7 | 0.16 | 0.055 | 0.12 | 0.53 |
| | 10/28/99 | 9' | 41 | 0.31 | 1.3 | 0.54 | 3.0 |
| B-12 | 10/28/99 | 4' | <1.0 | 0.016 | <0.005 | 0.018 | 0.022 |
| | 10/28/99 | 8' | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 |
| B-13[1] | 10/28/99 | 4' | <5.0 | <0.03 | <0.03 | <0.03 | <0.03 |
| | 10/28/99 | 8' | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 |
| B-14 | 10/28/99 | 4' | 1.2 | 0.078 | <0.005 | 0.032 | 0.071 |
| | 10/28/99 | 8' | 610 | 5.4 | 27 | 17 | 85 |
| B-15 | 10/28/99 | 5' | <2.0 | <0.01 | <0.01 | <0.01 | <0.01 |
| | 10/28/99 | 10' | <1.0 | 0.01 | <0.005 | <0.005 | <0.005 |

Explanation:

PPM = Parts Per Million

Notes:

[1] Sample diluted due to high concentrations of non-target hydrocarbons.

Table 2. Analytical Results for Soil - Over Excavation Samples - 7716 Old Redwood Highway, Cotati, California

| Sample ID Sample Depth | Sample Date | TPH(G) | TPH(D) | Benzene | Toluene | Ethyl Benzene | Xylene | MTBE |
|---|---|---|---|---|---|---|---|---|
| | | <---------- PPM ----------> | | | | | | |
| OXS-19 / 8' | 1/28/00 | 1,000 | <1.0 [1] | 5.1 | 36 | 11 | 62 | 21 |
| OXS-20 / 8' | 1/28/00 | 390 | <1.0 [1] | 0.96 | 8.2 | 4.8 | 19 | 1.0 |
| OXS-21 / 8' | 1/28/00 | 2,800 | 580 [1] | 8.8 | 94 | 47 | 200 | 14 |
| OXS-22 / 8' | 1/28/00 | 210 | <1.0 | 1.7 | 9.1 | 1.8 | 8.1 | 39 |
| OXS-23 / 8' | 1/28/00 | 1,300 | 660 [1] | <5.0 | 60 | 18 | 91 | 100 |
| OXS-24 / 8' | 1/28/00 | 3,000 | 360 [1] | 12 | 120 | 41 | 200 | 65 |
| OXS-25 / 8' | 1/28/00 | 16,000 | 2,400 [1] | 84 | 460 | 190 | 690 | 810 |
| OXS-26 / 8' | 1/28/00 | 5,900 | 150 [1] | 33 | 180 | 73 | 270 | 87 |
| OXS-27 / 8' | 1/28/00 | 1,100 | <1.0 [1] | <5.0 | 27 | 9.8 | 56 | 12 |
| OXS-28 / 8' | 1/28/00 | 4,100 | 370 [1] | 22 | 110 | 57 | 200 | 61 |
| OXS-29 / 8' | 1/28/00 | 6,000 | 440 [1] | 19 | 170 | 89 | 330 | 19 |
| OXS-30 / 8' | 1/28/00 | 1,900 | 170 [1] | 5.9 | 53 | 25 | 120 | 29 |
| OXS-31 / 8' | 1/28/00 | 1,400 | 38 [1] | <5.0 | 32 | 17 | 80 | <5.0 |
| OXS-32 / 8' | 1/28/00 | 3,700 | 300 [1] | 13 | 110 | 57 | 240 | 34 |

NOTES :

1. TPH (G) was present in the diesel range

Table 2. Analytical Results for Soil - Over Excavation Samples - 7716 Old Redwood Highway, Cotati, California

| Sample ID Sample Depth | Sample Date | TPH(G) | TPH(D) | Benzene | Toluene | Ethyl Benzene | Xylenes | MTBE |
|---|---|---|---|---|---|---|---|---|
| | | <---------- PPM ----------> | | | | | | |
| OXS-1 / 6' | 1/27/00 | <1.0 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| OXS-2 / 8' | 1/27/00 | 400 | 57 [1] | <0.50 | 1.9 | 3.3 | 18 | <0.50 |
| OXS-3 / 8' | 1/27/00 | 2,000 | 380 [1] | <2.5 | 30 | 36 | 140 | 11 |
| OXS-4 / 8' | 1/27/00 | 1.9 | <1.0 | 0.02 | 0.006 | 0.02 | 0.04 | 3,000 |
| OXS-5 / 6' | 1/27/00 | <1.0 | <1.0 | <0.005 | 0.006 | <0.005 | 0.01 | 0.05 |
| OXS-6 / 6' | 1/27/00 | 2.9 | <1.0 | 0.02 | 0.04 | 0.04 | 0.14 | 0.10 |
| OXS-7 / 6' | 1/27/00 | <1.0 | <1.0 | <0.005 | <0.005 | <0.005 | 0.03 | 0.08 |
| OXS- 8 / 8' | 1/27/00 | 14 | <1.0 | 0.20 | 0.14 | 0.19 | 0.43 | 5400 |
| OXS-9 / 8' | 1/27/00 | 130 | <1.0 | 0.56 | 2.2 | 0.83 | 5.6 | 3.2 |
| OXS-10 / 8' | 1/27/00 | 290 | <1.0 | 1.2 | 4.4 | 5.8 | 17 | 4.3 |
| OXS-11 / 10' | 1/27/00 | 810 | 66 [1] | 0.51 | 11 | 5.4 | 70 | 1.8 |
| OXS-12 / 8' | 1/27/00 | 490 | 500 [1] | 2.1 | 14 | 8.4 | 35 | 14 |
| OXS-13 / 8' | 1/27/00 | 9,300 | 1,200 [1] | 48 | 330 | 160 | 670 | 270 |
| OXS-14 / 8' | 1/27/00 | 11,000 | 1,500 [1] | 65 | 340 | 190 | 770 | 360 |
| OXS-15 / 8' | 1/27/00 | 2,600 | 270 [1] | 12 | 80 | 48 | 190 | 68 |
| OXS-16 / 6' | 1/28/00 | <0.005 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | .011 |
| OXS-17 / 8' | 1/28/00 | 170 | <1.0 | 0.91 | 4.4 | 2.1 | 8.6 | 2.3 |
| OXS-18 / 8' | 1/28/00 | 79 | <1.0 [1] | <0.25 | 2.7 | 0.99 | 4.9 | 0.85 |

Table 2. Analytical Results for Soil - Over Excavation Samples - 7716 Old Redwood Highway, Cotati, California

| Sample ID Sample Depth | Sample Date | TPH(G) | TPH(D) | Benzene | Toluene | Ethyl Benzene | Xylenes | MTBE |
|---|---|---|---|---|---|---|---|---|
| | | <---------- PPM ----------> | | | | | | |
| TXS-1 / 8' | 3/7/00 | 12,000 | 690[1] | 120 | 700 | 220 | 1,100 | 340[3] |
| TXS-2 / 18' | 3/7/00 | 120 | <1.0 | 3.1 | 7.3 | 1.2 | 5.3 | 14[3] |
| TXS-3 / 18' | 3/7/00 | 1.1 | <1.0 | 0.02 | 0.04 | 0.008 | 0.05 | 1.1[3] |
| TXS-4 / 8' | 3/7/00 | 120 | <1.0 | 0.74 | 6.0 | 2.6 | 14 | 10[3] |
| TXS-5 / 8' | 3/7/00 | 31 | <1.0 | <0.13 | 1.9 | 0.68 | 3.2 | 0.32[3] |
| TXS-6 / 8' | 3/7/00 | 18 | <1.0 | 0.05 | 0.03 | <0.03 | <0.03 | 35[3] |
| TXS-7 / 8' | 3/7/00 | 40,000 | 370[1] | 47 | 350 | 110 | 570 | 340[3] |
| TXS-8 / 8' | 3/7/00 | 1,500 | 73[1] | 13 | 87 | 37 | 140 | 110[3] |
| TXS-9 / 8' | 3/7/00 | 3,400 | 290[1] | 22 | 170 | 62 | 310 | 220[3] |
| TXS-10 / 8' | 3/7/00 | 1,200 | 130[1] | 13 | 73 | 29 | 120 | 97[3] |
| TXS-11 / 8' | 3/7/00 | 280 | 19[1] | <0.25 | 0.56 | 2.6 | 5.1 | 0.64[3] |
| TXS-12 / 8' | 3/7/00 | 8,300 | 25[1] | 2.9 | 15 | 15 | 47 | 0.5[4] |
| TXS-13 / 8' | 3/7/00 | 250 | 13[1] | 0.32 | 1.0 | 2.5 | 6.0 | 0.26[3] |
| TXS-14 / 7' | 3/7/00 | <1.0[2] | <1.0 | 0.007 | 0.005 | 0.01 | 0.005 | 1.5[3] |
| TXS-15 / 18' | 3/7/00 | <1.0 | <1.0 | 0.005 | <0.005 | <0.005 | <0.005 | 0.52[5] |
| TXS-16 / 18' | 3/7/00 | <1.0 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | 1.3[3] |

Table 2. Analytical Results for Soil - Over Excavation Samples - 7716 Old Redwood Highway, Cotati, California

Explanation:

TPH(G) - Total Petroleum Hydrocarbons as Gasoline
TPH(D) - Total Petroleum Hydrocarbons as Diesel
MTBE - Methyl-tert-butyl-ether
PPM - Parts per Million

Notes:

[1] TPH(G) was present in the TPHdiesel range.
[2] TPH(G) was present below the reporting limit (@620 ppb)
[3] Analyzed by EPA Method 8260 for fuel oxygenates. No other oxygenates detected. Detection limits are shown in laboratory analytical report.
[4] Analyzed by EPA Method 8260 for fuel oxygenates. Tertiary butanol detected at 0.42 ppm. No other oxygenates detected.
[5] Analyzed by EPA Method 8260 for fuel oxygenates. Tertiary butanol detected at 0.5 ppm. No other oxygenates detected.

Table 3. Analytical Results for Soil - Monitoring Wells and Borings - Redwood Oil Service Station - 7716 Old Redwood Highway, Cotati, California

| Sample ID | Sample Date | Sample Depth (in feet) | TPPH-Gas | TPH-Diesel | Benzene | Toluene | Ethyl Benzene | Xylenes | MTBE | O&G | VOCs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | <---------- ppm ----------> | | | | | | | | |
| MW-1 | 9/18/91 | 3.5 - 4.0 | 9.0 | --- | 0.42 | 0.49 | 0.23 | 1.1 | --- | --- | -- |
| | 9/18/91 | 15 -15.5 | 100 | --- | 1.5 | 6.0 | 1.8 | 8.7 | --- | --- | --- |
| | 9/18/91 | 24 - 24.5 | 1.4 | --- | 0.42 | 0.023 | 0.06 | 0.035 | --- | --- | --- |
| | 9/18/91 | 29.5 - 30 | <1.0 | --- | 0.0032 | 0.0033 | <0.0025 | <0.0025 | --- | --- | --- |
| | | | | | | | | | | | |
| MW-2 | 9/19/91 | 6 - 6.5 | <1.0 | --- | 0.022 | <0.0025 | 0.0055 | 0.014 | --- | <50 | ND[1] |
| | 9/19/91 | 14.5 - 15 | 1.3 | --- | 0.093 | <0.0025 | 0.0087 | <0.0025 | --- | <50 | ND[1] |
| | 9/19/91 | 25.5 - 26 | <1.0 | --- | <0.0025 | <0.0025 | <0.0025 | <0.0025 | --- | <50 | ND[1] |
| | | | | | | | | | | | |
| MW-3 | 9/20/91 | 5.5 - 6.0 | 240 | --- | 0.34 | 8.1 | 4.9 | 21.1 | --- | --- | --- |
| | 9/20/91 | 14.5 - 15 | 1.3 | --- | 0.28 | 0.0057 | 0.019 | 0.022 | --- | --- | --- |
| | 9/20/91 | 25.5 - 26 | <1.0 | --- | 0.0031 | 0.0031 | <0.0025 | <0.0025 | --- | --- | --- |
| | | | | | | | | | | | |
| G - 5 | 10/15/93 | 5.5 | <1.0 | --- | 0.0052 | <0.0025 | <0.0025 | <0.0025 | --- | --- | --- |
| | | | | | | | | | | | |
| G - 6 | 10/15/93 | 5.5 | 1,700 | --- | 1.8 | 12.0 | 12.0 | 65.0 | --- | --- | --- |
| | | | | | | | | | | | |
| G - 14 | 2/9/98 | 4.0 | <1.0 | --- | <0.005 | <0.005 | <0.005 | <0.005 | --- | --- | --- |

Table 3. Analytical Results for Soil - Monitoring Wells and Borings - Redwood Oil Service Station - 7716 Old Redwood Highway, Cotati, California

| Sample ID | Sample Date | Sample Depth (in feet) | TPPH-Gas | TPH-Diesel | Benzene | Toluene | Ethyl Benzene | Xylenes | MTBE | O&G | VOCs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | <---------- ppm ----------> | | | | | | | | |
| G - 15 | 2/9/98 | 4.0 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | --- | --- | --- |
| | | | | | | | | | | | |
| G-16 | 4/19/00 | 6.5' | <1.0 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | --- | --- | --- |
| | | | | | | | | | | | |
| G-17 | 4/19/00 | 6.5' | <1.0 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | --- | --- | --- |
| | | | | | | | | | | | |
| MW-4 | 4/19/00 | 6.5' | <1.0 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | --- | --- | --- |
| | | | | | | | | | | | |
| MW-1A | 3/20/01 | 8.0' | <1.0 | --- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | --- | --- |
| | | | | | | | | | | | |
| MW-2A | 3/20/01 | 5.5' | <1.0 | --- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | --- | --- |
| | 3/20/01 | 11.0' | <1.0 | --- | 0.00800 | <0.005 | 0.00600 | 0.00600 | 0.0430 | --- | --- |
| | 3/20/01 | 16.0' | 140 | --- | <0.1 | 1.2 | 1.0 | 6.0 | 0.35 | --- | --- |
| | | | | | | | | | | | |
| MW-5 | 10/16/02 | 5' | <2.5 | — | <0.025 | <0.025 | <0.025 | <0.05 | <0.25 | — | --- |
| | 10/16/02 | 10' | <2.5 | — | <0.025 | <0.025 | <0.025 | <0.05 | <0.25 | — | --- |
| | | | | | | | | | | | |
| MW-6 | 10/16/02 | 6' | <2.5 | — | <0.025 | <0.025 | <0.025 | <0.05 | <0.25 | — | --- |
| | 10/16/02 | 10' | <2.5 | — | <0.025 | <0.025 | <0.025 | <0.05 | <0.25 | — | --- |

Table 3. Analytical Results for Soil - Monitoring Wells and Borings - Redwood Oil Service Station - 7716 Old Redwood Highway, Cotati, California

Explanation:

PPM = Parts Per Million
TPPH(G) = Total Purgeable Petroleum Hydrocarbons as gasoline
TPH(D) = Total Petroleum Hydrocarbons as diesel
MTBE = Methyl-tert-butyl-ether
--- = Not analyzed
ND = Not detected

Notes:

[1] Acetone and xylenes (total) were detected at 0.023 and 0.0058 ppm, respectively. The laboratory method blank contained 31 ug/kg acetone.

Table 4. Water Level Data Well Construction Details - Redwood Oil Service Station #102 7716 Old Redwood Highway, Cotati, California

| Well ID | Sample Date | DTW (Ft) | TOC (Ft, msl) | GWE (Ft, msl) | Product Thickness (ft) | Screen Interval | Sand Pack Interval | Bentonite/ Grout Interval | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **MW-1** | 9/26/1991 | 15.89 | 101.59 | 85.70 | 0.00 | 10 - 25 | 8 - 25 | 0 - 8 | |
| | 12/19/1991 | 18.30 | | 83.29 | 0.00 | | | | |
| | 3/16/1992 | 7.61 | | 93.98 | 0.00 | | | | |
| | 6/24/1992 | 9.27 | | 92.32 | 0.00 | | | | |
| | 9/23/1992 | 14.16 | | 87.43 | 0.00 | | | | |
| | 12/18/1992 | 9.31 | | 92.28 | 0.00 | | | | |
| | 3/22/1993 | 4.60 | | 96.99 | 0.00 | | | | |
| | 6/22/1993 | 8.50 | | 93.09 | 0.00 | | | | |
| | 9/24/1993 | 10.65 | | 90.94 | 0.00 | | | | |
| | 12/28/1993 | 9.66 | | 91.93 | 0.00 | | | | |
| | 3/25/1994 | 8.16 | | 93.43 | 0.00 | | | | |
| | 6/20/1994 | 9.06 | | 92.53 | 0.00 | | | | |
| | 9/8/1994 | 10.35 | | 91.24 | 0.00 | | | | |
| | 12/12/1994 | 8.44 | | 93.15 | 0.00 | | | | |
| | 3/15/1995 | 3.95 | | 97.64 | 0.00 | | | | |
| | 7/6/1995 | 6.93 | | 94.66 | 0.00 | | | | |
| | 9/19/1995 | 9.39 | | 92.20 | 0.00 | | | | |
| | 12/20/1995 | 12.70 | | 88.89 | 0.00 | | | | |
| | 3/28/1996 | 6.39 | | 95.20 | 0.00 | | | | |
| | 6/24/1996 | 9.36 | | 93.75 | 1.90 | | | | Note 1: GWE corrected for the presence of free phase hydrocarbons. |
| | 9/26/1996 | 12.88 | | 91.93 | 4.02 | | | | See Note 1 |
| | 12/31/1996 | 4.51 | | 97.26 | 0.22 | | | | See Note 1 |
| | 3/18/1997 | 6.84 | | 94.77 | 0.02 | | | | See Note 1 |
| | 6/30/1997 | 9.33 | | 92.26 | trace | | | | |
| | 9/26/1997 | 11.25 | | 90.62 | 0.35 | | | | See Note 1 |
| | 12/10/1997 | 5.96 | | 95.72 | 0.11 | | | | See Note 1 |
| | 3/9/1998 | 3.79 | | 97.80 | 0.00 | | | | |
| | 6/16/1998 | 7.00 | | 94.59 | 0.00 | | | | |
| | 9/14/1998 | 9.22 | | 92.37 | 0.00 | | | | |
| | 12/15/1998 | 7.30 | | 94.32 | 0.04 | | | | See Note 1 |
| | 3/24/1999 | 5.65 | | 95.94 | 0.00 | | | | |
| | 6/11/1999 | 8.10 | | 93.49 | 0.00 | | | | |
| | 9/9/1999 | — | | — | --- | | | | Well damaged during UST removal. |

Table 4. Water Level Data Well Construction Details - Redwood Oil Service Station #102 7716 Old Redwood Highway, Cotati, California

| Well ID | Sample Date | DTW (Ft) | TOC (Ft, msl) | GWE (Ft, msl) | Product Thickness (ft) | Screen Interval | Sand Pack Interval | Bentonite/ Grout Interval | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **MW-1A** | 3/26/2001 | 5.93 | 101.45 | 95.52 | 0.00 | 5 - 20 | 4 - 20 | 0 - 4 | |
| | 6/19/2001 | 6.75 | | 94.70 | 0.00 | | | | |
| | 9/7/2001 | 10.47 | | 90.98 | 0.00 | | | | |
| | 12/4/2001 | 6.41 | | 95.04 | 0.00 | | | | |
| | 2/26/2002 | 5.62 | 103.85 | 98.23 | 0.00 | | | | Monitoring well surveyed for EDF compliance, November 5, 2001. |
| | 5/17/2002 | 6.52 | | 97.33 | 0.00 | | | | |
| | 8/29/2002 | 9.47 | | 94.38 | 0.00 | | | | |
| | 11/26/2002 | 7.07 | | 96.78 | 0.00 | | | | |
| | 2/20/2003 | 4.92 | | 98.93 | 0.00 | | | | |
| | 5/23/2003 | 6.76 | | 97.09 | 0.00 | | | | |
| | 8/20/2003 | 8.66 | | 95.19 | 0.00 | | | | |
| | 11/20/2003 | 7.15 | | 96.70 | 0.00 | | | | |
| | 2/23/2004 | 5.67 | | 98.18 | 0.00 | | | | |
| | 5/12/2004 | 6.02 | | 97.83 | 0.00 | | | | |
| | 8/23/2004 | 8.64 | | 95.21 | 0.00 | | | | |
| | 11/10/2004 | 6.80 | | 97.05 | 0.00 | | | | |
| | 2/22/2005 | 3.92 | | 99.93 | 0.00 | | | | |
| | 5/11/2005 | 4.75 | | 99.10 | 0.00 | | | | |
| | **8/11/2005** | **6.29** | | **97.56** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-2** | 9/26/1991 | 15.90 | 101.59 | 85.69 | 0.00 | 10 - 25 | 8 - 25 | 0 - 8 | |
| | 12/19/1991 | 18.19 | | 83.40 | 0.00 | | | | |
| | 3/16/1992 | 7.91 | | 93.68 | 0.00 | | | | |
| | 6/24/1992 | 9.47 | | 92.12 | 0.00 | | | | |
| | 9/23/1992 | 14.41 | | 87.18 | 0.00 | | | | |
| | 12/18/1992 | 10.31 | | 91.28 | 0.00 | | | | |
| | 3/22/1993 | 6.48 | | 95.11 | 0.00 | | | | |
| | 6/22/1993 | 7.61 | | 93.98 | 0.00 | | | | |
| | 9/24/1993 | 10.82 | | 90.77 | 0.00 | | | | |
| | 12/28/1993 | 10.24 | | 91.35 | 0.00 | | | | |
| | 3/25/1994 | 7.85 | | 93.74 | 0.00 | | | | |
| | 6/20/1994 | 8.94 | | 92.65 | 0.00 | | | | |
| | 9/8/1994 | 10.62 | | 90.97 | 0.00 | | | | |

Table 4. Water Level Data Well Construction Details - Redwood Oil Service Station #102 7716 Old Redwood Highway, Cotati, California

| Well ID | Sample Date | DTW (Ft) | TOC (Ft, msl) | GWE (Ft, msl) | Product Thickness (ft) | Screen Interval | Sand Pack Interval | Bentonite/ Grout Interval | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **MW-2** | 12/12/1994 | 8.80 | 101.59 | 92.79 | 0.00 | 10 - 25 | 8 - 25 | 0 - 8 | |
| | 3/15/1995 | 4.07 | | 97.52 | 0.00 | | | | |
| | 7/6/1995 | 7.25 | | 94.34 | 0.00 | | | | |
| | 9/19/1995 | 9.30 | | 92.29 | 0.00 | | | | |
| | 12/20/1995 | 8.81 | | 92.78 | 0.00 | | | | |
| | 3/28/1996 | 6.34 | | 95.25 | 0.00 | | | | |
| | 6/24/1996 | 7.64 | | 93.95 | 0.00 | | | | |
| | 9/26/1996 | 13.07 | | 91.50 | 3.72 | | | | See Note 1 |
| | 12/31/1996 | 5.79 | | 95.95 | 0.19 | | | | See Note 1 |
| | 3/18/1997 | 7.14 | | 94.56 | 0.14 | | | | See Note 1 |
| | 6/30/1997 | 9.85 | | 92.43 | 0.86 | | | | See Note 1 |
| | 9/26/1997 | 11.83 | | 90.66 | 1.12 | | | | See Note 1 |
| | 12/10/1997 | 7.71 | | 94.30 | 0.52 | | | | See Note 1 |
| | 3/9/1998 | 4.88 | | 96.71 | 0.00 | | | | |
| | 6/16/1998 | 6.63 | | 94.98 | 0.03 | | | | See Note 1 |
| | 9/14/1998 | 9.96 | | 91.64 | 0.01 | | | | See Note 1 |
| | 12/15/1998 | 9.63 | | 92.86 | 1.13 | | | | See Note 1 |
| | 3/24/1999 | 6.25 | | 95.36 | 0.02 | | | | See Note 1 |
| | 6/11/1999 | 7.53 | | 94.08 | 0.02 | | | | See Note 1 |
| | 9/9/1999 | 9.51 | | 92.28 | 0.25 | | | | See Note 1 |
| | 3/21/2000 | — | | — | --- | | | | Well abandoned on January 24, 2000. |
| | | | | | | | | | |
| **MW-2A** | 3/26/2001 | 7.17 | 102.00 | 94.83 | 0.00 | 5 - 20 | 4 - 20 | 0 - 4 | |
| | 6/19/2001 | 8.75 | | 93.25 | 0.00 | | | | |
| | 9/7/2001 | 7.04 | | 94.96 | 0.00 | | | | |
| | 12/4/2001 | 8.75 | | 93.25 | 0.00 | | | | |
| | 2/26/2002 | 6.10 | 104.40 | 98.30 | 0.00 | | | | Monitoring well surveyed for EDF compliance, November 5, 2001. |
| | 5/17/2002 | 7.88 | | 96.52 | 0.00 | | | | |
| | 8/29/2002 | 6.85 | | 97.55 | 0.00 | | | | |
| | 11/26/2002 | 9.49 | | 94.91 | 0.00 | | | | |
| | 2/20/2003 | 5.85 | | 98.55 | 0.00 | | | | |
| | 5/23/2003 | 5.42 | | 98.98 | 0.00 | | | | |
| | 8/20/2003 | 6.84 | | 97.56 | 0.00 | | | | |

Table 4. Water Level Data Well Construction Details - Redwood Oil Service Station #102 7716 Old Redwood Highway, Cotati, California

| Well ID | Sample Date | DTW (Ft) | TOC (Ft, msl) | GWE (Ft, msl) | Product Thickness (ft) | Screen Interval | Sand Pack Interval | Bentonite/ Grout Interval | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **MW-2A** | 11/20/2003 | 10.08 | 104.40 | 94.32 | 0.00 | 5 - 20 | 4 - 20 | 0 - 4 | |
| | 2/23/2004 | 3.74 | | 100.66 | 0.00 | | | | |
| | 5/12/2004 | 7.37 | | 97.03 | 0.00 | | | | |
| | 8/23/2004 | 6.89 | | 97.51 | 0.00 | | | | |
| | 11/10/2004 | 8.48 | | 95.92 | 0.00 | | | | |
| | 2/22/2005 | 5.57 | | 98.83 | 0.00 | | | | |
| | 5/11/2005 | 6.74 | | 97.66 | 0.00 | | | | |
| | **8/11/2005** | **7.47** | | **96.93** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-3** | 9/26/1991 | 13.88 | 101.13 | 87.25 | 0.00 | 10 - 25 | 8 - 25 | 0 - 8 | |
| | 12/19/1991 | 16.04 | | 85.09 | 0.00 | | | | |
| | 3/16/1992 | 7.14 | | 93.99 | 0.00 | | | | |
| | 6/24/1992 | 8.25 | | 92.88 | 0.00 | | | | |
| | 9/23/1992 | 12.46 | | 88.67 | 0.00 | | | | |
| | 12/18/1992 | 9.25 | | 91.88 | 0.00 | | | | |
| | 3/22/1993 | 6.02 | | 95.11 | 0.00 | | | | |
| | 6/22/1993 | 7.00 | | 94.13 | 0.00 | | | | |
| | 9/24/1993 | 9.36 | | 91.77 | 0.00 | | | | |
| | 12/28/1993 | 8.99 | | 92.14 | 0.00 | | | | |
| | 3/25/1994 | 6.96 | | 94.17 | 0.00 | | | | |
| | 6/20/1994 | 7.83 | | 93.30 | 0.00 | | | | |
| | 9/8/1994 | 9.11 | | 92.02 | 0.00 | | | | |
| | 12/12/1994 | 7.75 | | 93.38 | 0.00 | | | | |
| | 3/15/1995 | 3.62 | | 97.51 | 0.00 | | | | |
| | 7/6/1995 | 6.63 | | 94.50 | 0.00 | | | | |
| | 9/19/1995 | 8.31 | | 92.82 | 0.00 | | | | |
| | 12/20/1995 | 7.70 | | 93.43 | 0.00 | | | | |
| | 3/28/1996 | 5.77 | | 95.36 | 0.00 | | | | |
| | 6/24/1996 | 6.81 | | 94.32 | 0.00 | | | | |
| | 9/26/1996 | 8.90 | | 92.23 | 0.00 | | | | |
| | 12/31/1996 | 5.16 | | 95.97 | 0.00 | | | | |
| | 3/18/1997 | 6.22 | | 94.91 | 0.00 | | | | |
| | 6/30/1997 | 8.01 | | 93.12 | 0.00 | | | | |
| | 9/26/1997 | 9.33 | | 91.80 | 0.00 | | | | |

Table 4. Water Level Data Well Construction Details - Redwood Oil Service Station #102 7716 Old Redwood Highway, Cotati, California

| Well ID | Sample Date | DTW (Ft) | TOC (Ft, msl) | GWE (Ft, msl) | Product Thickness (ft) | Screen Interval | Sand Pack Interval | Bentonite/ Grout Interval | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **MW-3** | 12/10/1997 | 6.64 | 101.13 | 94.49 | 0.00 | 10 - 25 | 8 - 25 | 0 - 8 | |
| | 3/9/1998 | 4.53 | | 96.60 | 0.00 | | | | |
| | 6/16/1998 | 6.74 | | 94.39 | 0.00 | | | | |
| | 9/14/1998 | 7.34 | | 93.79 | 0.00 | | | | |
| | 12/15/1998 | 5.60 | | 95.53 | 0.00 | | | | |
| | 3/24/1999 | 4.86 | | 96.27 | 0.00 | | | | |
| | 6/11/1999 | 6.50 | 100.87 | 94.63 | 0.00 | | | | |
| | 9/9/1999 | 7.91 | | 93.22 | 0.00 | | | | |
| | 3/21/2000 | 5.58 | | 95.55 | 0.00 | | | | |
| | 10/2/2000 | 8.11 | | 93.02 | 0.00 | | | | |
| | 3/26/2001 | 5.80 | 103.27 | 95.07 | 0.00 | | | | Monitoring well surveyed for EDF compliance, November 5, 2001. |
| | 6/19/2001 | 7.17 | | 93.70 | 0.00 | | | | |
| | 9/7/2001 | 8.80 | | 92.07 | 0.00 | | | | |
| | 12/4/2001 | 7.40 | | 93.47 | 0.00 | | | | |
| | 2/26/2002 | 4.97 | | 98.30 | 0.00 | | | | |
| | 5/17/2002 | 6.46 | | 96.81 | 0.00 | | | | |
| | 8/29/2002 | 7.95 | | 95.32 | 0.00 | | | | |
| | 11/26/2002 | 8.70 | | 94.57 | 0.00 | | | | |
| | 2/20/2003 | 4.79 | | 98.48 | 0.00 | | | | |
| | 5/23/2003 | 5.39 | | 97.88 | 0.00 | | | | |
| | 8/20/2003 | 7.35 | | 95.92 | 0.00 | | | | |
| | 11/20/2003 | 8.55 | | 94.72 | 0.00 | | | | |
| | 2/23/2004 | 4.20 | | 99.07 | 0.00 | | | | |
| | 5/12/2004 | 6.05 | | 97.22 | 0.00 | | | | |
| | 8/23/2004 | 7.34 | | 95.93 | 0.00 | | | | |
| | 11/10/2004 | 7.47 | | 95.80 | 0.00 | | | | |
| | 2/22/2005 | 4.31 | | 98.96 | 0.00 | | | | |
| | 5/11/2005 | 4.60 | | 98.67 | 0.00 | | | | |
| | **8/11/2005** | **6.06** | | **97.21** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-4** | 5/4/2000 | 4.02 | 99.49 | --- | 0.00 | 5 - 25 | 4 - 25 | 0 - 4 | |
| | 10/2/2000 | 8.18 | | --- | 0.00 | | | | |
| | 3/26/2001 | 4.28 | | 95.21 | 0.00 | | | | |

Table 4. Water Level Data Well Construction Details - Redwood Oil Service Station #102 7716 Old Redwood Highway, Cotati, California

| Well ID | Sample Date | DTW (Ft) | TOC (Ft, msl) | GWE (Ft, msl) | Product Thickness (ft) | Screen Interval | Sand Pack Interval | Bentonite/ Grout Interval | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **MW-4** | 6/19/2001 | 6.97 | 99.49 | 92.52 | 0.00 | 5 - 25 | 4 - 25 | 0 - 4 | |
| | 9/7/2001 | 9.51 | | 89.98 | 0.00 | | | | |
| | 12/4/2001 | 6.75 | | 92.74 | 0.00 | | | | |
| | 2/26/2002 | 3.45 | 101.89 | 98.44 | 0.00 | | | | Monitoring well surveyed for EDF compliance, November 5, 2001. |
| | 5/17/2002 | 5.35 | | 96.54 | 0.00 | | | | |
| | 8/29/2002 | 8.41 | | 93.48 | 0.00 | | | | |
| | 11/26/2002 | 9.47 | | 92.42 | 0.00 | | | | |
| | 2/20/2003 | 3.65 | | 98.24 | 0.00 | | | | |
| | 5/23/2003 | 4.27 | | 97.62 | 0.00 | | | | |
| | 8/20/2003 | 7.40 | | 94.49 | 0.00 | | | | |
| | 11/20/2003 | 9.00 | | 92.89 | 0.00 | | | | |
| | 2/23/2004 | 2.32 | | 99.57 | 0.00 | | | | |
| | 5/12/2004 | 4.86 | | 97.03 | 0.00 | | | | |
| | 8/23/2004 | 7.34 | | 94.55 | 0.00 | | | | |
| | 11/10/2004 | 6.62 | | 95.27 | 0.00 | | | | |
| | 2/22/2005 | 1.37 | | 100.52 | 0.00 | | | | |
| | 5/11/2005 | 2.48 | | 99.41 | 0.00 | | | | |
| | **8/11/2005** | **5.86** | | **96.03** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-5** | 11/26/2002 | 8.81 | 102.41 | 93.60 | 0.00 | 5 - 25 | 4 - 25 | 0 - 4 | Monitoring well surveyed for EDF compliance, November 16, 2002. |
| | 2/20/2003 | 3.45 | | 98.96 | 0.00 | | | | |
| | 5/23/2003 | 4.02 | | 98.39 | 0.00 | | | | |
| | 8/20/2003 | — | | — | --- | | | | Well inaccessible. |
| | 11/20/2003 | 8.48 | | 93.93 | 0.00 | | | | |
| | 2/23/2004 | 2.88 | | 99.53 | 0.00 | | | | |
| | 5/12/2004 | 5.30 | | 97.11 | 0.00 | | | | |
| | 8/23/2004 | 7.20 | | 95.21 | 0.00 | | | | |
| | 11/10/2004 | 6.46 | | 95.95 | 0.00 | | | | |
| | 2/22/2005 | 2.84 | | 99.57 | 0.00 | | | | |
| | 5/11/2005 | 4.35 | | 98.06 | 0.00 | | | | |
| | **8/11/2005** | **5.76** | | **96.65** | **0.00** | | | | |
| | | | | | | | | | |

Table 4. Water Level Data Well Construction Details - Redwood Oil Service Station #102 7716 Old Redwood Highway, Cotati, California

| Well ID | Sample Date | DTW (Ft) | TOC (Ft, msl) | GWE (Ft, msl) | Product Thickness (ft) | Screen Interval | Sand Pack Interval | Bentonite/ Grout Interval | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **MW-6** | 11/26/2002 | 10.48 | 104.26 | 93.78 | 0.00 | 5 - 25 | 4 - 25 | 0 - 4 | Monitoring well surveyed for EDF compliance, on November 16, 2002. |
| | 2/20/2003 | 7.32 | | 96.94 | 0.00 | | | | |
| | 5/23/2003 | 7.65 | | 96.61 | 0.00 | | | | |
| | 8/20/2003 | 8.49 | | 95.77 | 0.00 | | | | |
| | 11/20/2003 | 9.88 | | 94.38 | 0.00 | | | | |
| | 2/23/2004 | 7.01 | | 97.25 | 0.00 | | | | |
| | 5/12/2004 | 7.90 | | 96.36 | 0.00 | | | | |
| | 8/23/2004 | 8.61 | | 95.65 | 0.00 | | | | |
| | 11/10/2004 | 8.85 | | 95.41 | 0.00 | | | | |
| | 2/22/2005 | 6.42 | | 97.84 | 0.00 | | | | |
| | 5/11/2005 | 7.64 | | 96.62 | 0.00 | | | | |
| | **8/11/2005** | **7.80** | | **96.46** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-7A** | 4/27/2005 | 6.98 | 104.20 | 97.22 | 0.00 | 45 - 55 | 44 - 55 | 0 - 44 | |
| | **8/11/2005** | **7.89** | | **96.31** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-7B** | 4/27/2005 | 9.32 | 104.27 | 94.95 | 0.00 | 67 - 77 | 66 - 77 | 0 - 66 | |
| | **8/11/2005** | **10.22** | | **94.05** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-8A** | 4/27/2005 | 11.97 | 103.55 | 91.58 | 0.00 | 42 - 52 | 41 - 52 | 0 - 41 | |
| | **8/11/2005** | **6.44** | | **97.11** | **0.00** | | | | |
| | | | | | | | | | |
| **MW-8B** | 4/27/2005 | 8.69 | 103.70 | 95.01 | 0.00 | 62 - 72 | 61 - 73 | 0 - 61 | |
| | **8/11/2005** | **7.29** | | **96.41** | **0.00** | | | | |

Explanation:

| | |
|---|---|
| DTW | Depth to Water |
| ft | feet |
| TOC | Top of Casing |
| msl | Mean Sea Level |
| GWE | Ground Water Elevation |

Table 5. Analytic Results for Ground Water - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

| Well ID | Date Sampled | TPPH/TPH (G) | Benzene | Toluene | Ethyl benzene | Xylenes | Notes |
|---|---|---|---|---|---|---|---|
| | | <---------- ppb ----------> | | | | | |
| **MW-1** | 9/26/1991 | 50,000 | 17,000 | 3,600 | 1,200 | 4,700 | Analyzed for Or. Pb. No Or. Pb was detected. |
| | 12/19/1991 | 34,000 | 17,000 | 4,000 | 2,500 | 4,400 | |
| | 3/16/1992 | 77,000 | 16,000 | 23,000 | 2,900 | 13,000 | |
| | 6/24/1992 | 78,000 | 19,000 | 19,000 | 3,100 | 12,000 | |
| | 9/23/1992 | 110,000 | 25,000 | 31,000 | 2,400 | 16,000 | |
| | 12/18/1992 | 68,000 | 7,700 | 8,300 | 480 | 7,000 | |
| | 3/22/1993 | 3,600 | 150 | 250 | 46 | 310 | |
| | 6/22/1993 | 75,000 | 12,000 | 11,000 | 2,500 | 10,000 | |
| | 9/24/1993 | 680 | 180 | 37 | 10 | 20 | |
| | 3/25/1994 | 89,000 | 13,000 | 12,000 | 1,600 | 5,800 | |
| | 9/8/1994 | 570,000 | 18,000 | 11,000 | 2,000 | 4,200 | |
| | 3/15/1995 | 85,000 | 12,000 | 17,000 | 2,000 | 9,400 | Sample was flagged by lab. See laboratory analytical reports. |
| | 9/19/1995 | 100,000 | 13,000 | 9,300 | 2,800 | 12,000 | |
| | 3/28/1996 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 9/26/1996 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 3/18/1997 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 9/26/1997 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 3/9/1998 | 270,000 | 15,000 | 32,000 | 4,100 | 20,000 | |
| | 9/14/1998 | 1,700,000 | 20,000 | 59,000 | 19,000 | 130,000 | |
| | 3/25/1999 | 210,000 | 24,000 | 35,000 | 5,900 | 42,000 | Analyzed for HVOCs. HVOCs not detected |
| | 9/9/1999 | --- | --- | --- | --- | ---- | Well damaged during UST excavation. Well was abandoned on February 11, 2000. |
| | | | | | | | |
| **MW-1A** | 3/26/2001 | 28,000 | 200 | 780 | 290 | 3,100 | |
| | 6/19/2001 | 3,300 | 38 | 10 | 67 | 20 | |
| | 9/7/2001 | 45,000 | 3,600 | 4,800 | 2,900 | 8,300 | |
| | 12/4/2001 | 4,500 | 240 | <25 | 62 | 53 | |
| | 2/26/2002 | <2,500 | 150 | <25 | <25 | <25 | |
| | 5/17/2002 | 600 | 180 | 13 | 22 | 16 | |
| | 8/29/2002 | 29,000 | 1,800 | 1,200 | 1,900 | 2,600 | Sample was flagged by lab. See laboratory analytical reports. |
| | 11/26/2002 | 320 | 4 | 4 | 1 | 5 | |
| | 2/20/2003 | <250 | 140 | 10 | 9 | 10 | |
| | 5/23/2003 | 13,000 | 690 | 380 | 860 | 1,000 | |
| | 8/20/2003 | 4,200 | 840 | 110 | 730 | 235 | |
| | 11/20/2003 | 980 | 170 | 12 | 22 | 15 | |

Table 5. Analytic Results for Ground Water - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

| Well ID | Date Sampled | TPPH/TPH (G) | Benzene | Toluene | Ethyl benzene | Xylenes | Notes |
|---|---|---|---|---|---|---|---|
| | | <---------- ppb ----------> | | | | | |
| **MW-1A** | 5/12/2004 | 160 | <2.5 | <2.5 | <2.5 | <5 | |
| | 11/10/2004 | 170 | <2.5 | <2.5 | <2.5 | <5 | |
| | 5/11/2005 | 260 | 9.0 | 25 | 14 | 25 | |
| | | | | | | | |
| **MW-2** | 9/26/1991 | 300 | 59 | 0.6 | <0.5 | 4.1 | Analyzed for oil & grease, Or. Pb and HVOCs. No O&G, Or. Pb, or HVOCs were detected. |
| | 12/19/1991 | 2,400 | 1,200 | 46 | 11 | 47 | |
| | 3/16/1992 | 4,200 | 2,500 | <0.5 | 100 | 45 | |
| | 6/24/1992 | 5,300 | 2,600 | <0.5 | 120 | 53 | |
| | 9/23/1992 | 530 | 190 | 0.9 | 2.9 | <0.5 | |
| | 12/18/1992 | 3,100 | 1,600 | 5 | 40 | 17 | |
| | 3/22/1993 | 1,400 | 1,100 | 2.1 | 24 | 5.6 | |
| | 6/22/1993 | 850 | 450 | 4.8 | 16 | 4.2 | |
| | 9/24/1993 | 68,000 | 14,000 | 11,000 | 2,300 | 8,400 | |
| | 3/25/1994 | 1,500 | 510 | 94 | 30 | 40 | |
| | 9/8/1994 | 1,400 | 400 | 130 | 26 | 45 | |
| | 3/15/1995 | 5,900 | 2,500 | 5,300 | 160 | 7,200 | Sample was flagged by lab. See laboratory analytical reports. |
| | 9/19/1995 | 12,000 | 2,800 | 150 | 130 | 520 | |
| | 3/28/1996 | 24,000 | 3,000 | 3,400 | 490 | 2,100 | |
| | 9/26/1996 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 3/18/1997 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 9/26/1997 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 3/9/1998 | 73,000 | 7,300 | 5,400 | 770 | 3,100 | |
| | 9/14/1998 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 3/25/1999 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | 9/9/1999 | --- | --- | --- | --- | --- | Separate phase product present in well. Well MW-2 was abandoned on January 24, 2000. |
| | | | | | | | |
| **MW-2A** | 3/26/2001 | 110,000 | 8,000 | 30,000 | 2,900 | 17,000 | |
| | 6/19/2001 | 80,000 | 4,100 | 16,000 | 3,400 | 15,000 | |
| | 9/7/2001 | 1,800 | 35 | 14 | 16 | 32 | |
| | 12/4/2001 | 29,000 | 2,400 | 2,800 | 2,300 | 3,400 | |
| | 2/26/2002 | 60,000 | 3,700 | 6,800 | 3,100 | 7,300 | |
| | 5/17/2002 | 39,000 | 2,400 | 4,200 | 2,900 | 5,300 | |
| | 8/29/2002 | 2,500 | 190 | 16 | 21 | <25 | Sample was flagged by lab. See laboratory analytical reports. |

Table 5. Analytic Results for Ground Water - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

| Well ID | Date Sampled | TPPH/TPH (G) | Benzene | Toluene | Ethyl benzene | Xylenes | Notes |
|---|---|---|---|---|---|---|---|
| | | <---------- ppb ----------> | | | | | |
| **MW-2A** | 11/26/2002 | 8,400 | 600 | 170 | 1,200 | 561 | |
| | 2/20/2003 | 9,200 | 760 | 930 | 1,300 | 1,810 | |
| | 5/23/2003 | 1,100 | 57 | 9 | 9 | 9 | |
| | 8/20/2003 | 140 | 2 | <1 | <1 | 1 | |
| | 11/20/2003 | 9,900 | 630 | 110 | 990 | 290 | |
| | 5/12/2004 | 5,900 | 160 | 59 | 350 | 260 | |
| | 11/10/2004 | 11,000 | 630 | 350 | 930 | 1000 | |
| | 5/11/2005 | 5,400 | 160 | 150 | 380 | 460 | |
| | | | | | | | |
| **MW-3** | 9/26/1991 | 510 | 52 | 5.5 | 1.8 | 17 | Analyzed for Or. Pb. No Or. Pb was detected. |
| | 12/19/1991 | 9,400 | 3,700 | 310 | 140 | 280 | |
| | 3/16/1992 | 8,200 | 4,400 | 320 | 240 | 720 | |
| | 6/24/1992 | 21,000 | 11,000 | 770 | 730 | 2,500 | |
| | 9/23/1992 | 22,000 | 9,100 | 920 | 720 | 1,900 | |
| | 12/18/1992 | 9,600 | 2,600 | 73 | 180 | 130 | |
| | 3/22/1993 | 62,000 | 35,000 | 3,900 | 2,300 | 12,000 | |
| | 6/22/1993 | 32,000 | 13,000 | 940 | 1,100 | 3,800 | |
| | 9/24/1993 | 13,000 | 5,500 | 240 | 420 | 1,300 | |
| | 3/25/1994 | 24,000 | 11,000 | 530 | 610 | 2,300 | |
| | 9/8/1994 | 22,000 | 7,700 | 170 | 590 | 1,600 | |
| | 3/15/1995 | 110,000 | 33,000 | 2,800 | 2,000 | 8,000 | Sample was flagged by lab. See laboratory analytical reports. |
| | 9/19/1995 | 300,000 | 19,000 | 590 | 1,300 | 3,200 | |
| | 3/28/1996 | 55,000 | 19,000 | 420 | 1,600 | 3,000 | |
| | 9/26/1996 | 25,000 | 7,200 | 26 | 480 | 340 | |
| | 3/18/1997 | 36,000 | 14,000 | 240 | 950 | 1,000 | |
| | 9/26/1997 | 28,000 | 11,000 | 42 | 810 | 570 | |
| | 3/9/1998 | 71,000 | 28,000 | 580 | 1,800 | 3,200 | |
| | 9/14/1998 | 49,000 | 27,000 | 400 | <100 | 1,700 | |
| | 3/25/1999 | 85,000 | 25,000 | 370 | 2,300 | 2,800 | Samples were analyzed for HVOCs. HVOCs were not detected |
| | 9/9/1999 | 53,000 | 29,000 | <250 | 2,000 | 870 | |
| | 3/21/2000 | 160,000 | 12,000 | <50 | 2,000 | 1,700 | |
| | 10/2/2000 | 100,000 | 31,000 | <50 | 1,600 | 1,300 | |
| | 3/26/2001 | 51,000 | 22,000 | 55 | 540 | 130 | |
| | 6/19/2001 | 73,000 | 27,000 | <250 | 1,600 | 730 | |
| | 9/7/2001 | 53,000 | 17,000 | <250 | 1,200 | <250 | |

Table 5. Analytic Results for Ground Water - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

| Well ID | Date Sampled | TPPH/TPH (G) | Benzene | Toluene | Ethyl benzene | Xylenes | Notes |
|---|---|---|---|---|---|---|---|
| | | <---------- ppb ----------> | | | | | |
| **MW-3** | 12/4/2001 | 170,000 | 34,000 | <1,250 | 2,900 | <1,250 | |
| | 2/26/2002 | 96,000 | 30,000 | <500 | 1,700 | <500 | |
| | 5/17/2002 | 48,000 | 29,000 | <100 | 2,600 | 670 | |
| | 8/29/2002 | 93,000 | 44,000 | <500 | 2,500 | <1,000 | Sample was flagged by lab. See laboratory analytical reports. |
| | 11/26/2002 | 61,000 | 40,000 | 94 | 3,900 | 960 | |
| | 2/20/2003 | 36,000 | 24,000 | 67 | 1,500 | 137 | |
| | 5/23/2003 | 52,000 | 23,000 | 53 | 2,200 | 316 | |
| | 8/20/2003 | 33,000 | 24,000 | 38 | 1,100 | 110 | |
| | 11/20/2003 | 86,000 | 22,000 | <500 | 2,000 | <1,000 | |
| | 5/12/2004 | 59,000 | 26,000 | <250 | 2,400 | <500 | |
| | 11/10/2004 | 42,000 | 24,000 | <200 | 690 | <400 | |
| | 5/11/2005 | 42,000 | 25,000 | <250 | 970 | <250 | TPH(G) value is tesult of MTBE and Benzene within TPH(G) range. |
| | | | | | | | |
| **MW-4** | 5/4/2000 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| | 10/2/2000 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| | 3/26/2001 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| | 6/19/2001 | <50 | <0.5 | 0.84 | <0.5 | <0.5 | |
| | 2/26/2002 | <50 | 2.7 | 0.83 | 0.58 | 0.57 | |
| | 5/24/2002 | 52 | 5.4 | 6.8 | 2 | 7.1 | |
| | 8/29/2002 | 78 | 9.1 | 5.9 | 1.5 | 6.5 | |
| | 11/26/2002 | <50 | 3 | 5 | 1 | 5 | |
| | 2/20/2003 | <50 | 8 | 10 | 1 | 8 | |
| | 5/23/2003 | 170 | 3 | 5 | <1 | 2 | |
| | 8/20/2003 | <50 | 4 | <1 | <1 | 1 | |
| | 11/20/2003 | 64 | 3.9 | 9.8 | 1.4 | 7.2 | |
| | 5/12/2004 | <25 | <0.5 | <0.5 | <0.5 | <1 | |
| | 11/10/2004 | <25 | <0.5 | 0.62 | <0.5 | <1 | |
| | 5/11/2005 | 82 | 3.7 | 23 | 3.6 | 22 | |
| | | | | | | | |
| **MW-5** | 11/26/2002 | 50 | 4 | 6 | 1 | 7 | |
| | 2/20/2003 | 52 | 15 | 14 | 2 | 11 | |
| | 5/23/2003 | 75 | 3 | 5 | <1 | 2 | |
| | 8/20/2003 | — | — | — | — | --- | |
| | 11/20/2003 | 120 | 19 | 11 | 5.3 | 8.9 | |
| | 2/23/2004 | 120 | 6.5 | 16 | 2.2 | 15 | |

Table 5. Analytic Results for Ground Water - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

| Well ID | Date Sampled | TPPH/TPH (G) | Benzene | Toluene | Ethyl benzene | Xylenes | Notes |
|---|---|---|---|---|---|---|---|
| | | <---------- ppb ----------> | | | | | |
| **MW-5** | 5/12/2004 | <25 | <0.5 | <0.5 | <0.5 | <1 | |
| | 8/23/2004 | <25 | <0.5 | <0.5 | <0.5 | <1 | |
| | 11/10/2004 | <25 | <0.5 | 0.57 | <0.5 | <1 | |
| | 2/22/2005 | <50 | 0.5 | <0.5 | <0.5 | <0.5 | |
| | 5/11/2005 | 90 | 4.9 | 30 | 4.2 | 26 | |
| | **8/11/2005** | **130** | **5.9** | **22** | **3.3** | **26** | |
| | | | | | | | |
| **MW-6** | 11/26/2002 | 76 | 8 | 10 | 2 | 9 | |
| | 2/20/2003 | 80 | 29 | 25 | 3 | 17 | |
| | 5/23/2003 | 140 | 8 | 10 | <1 | 5 | |
| | 8/20/2003 | <50 | 5 | 1 | <1 | 2 | |
| | 11/20/2003 | 140 | 13 | 22 | 2.4 | 13 | |
| | 2/23/2004 | 180 | 13 | 26 | 3.2 | 21 | |
| | 5/12/2004 | <25 | <0.5 | <0.5 | <0.5 | <1 | |
| | 8/23/2004 | <25 | <0.5 | <0.5 | <0.5 | <1 | |
| | 11/10/2004 | <25 | <0.5 | 0.74 | <0.5 | <1 | |
| | 2/22/2005 | <50 | 0.88 | <0.5 | <0.5 | <0.5 | |
| | 5/11/2005 | 150 | 12 | 57 | 6.5 | 38 | |
| | **8/11/2005** | **200** | **11** | **33** | **4.6** | **36** | |
| | | | | | | | |
| **MW-7A** | 4/27/2005 | 39,000 | <250 | <250 | <250 | <250 | |
| | **8/11/2005** | **<50,000** | **<500** | **<500** | **<500** | **<500** | Detetion limits raised due to the high concentration of MTBE |
| | | | | | | | |
| **MW-7B** | 4/27/2005 | 28 | 0.87 | 1.4 | 2.1 | 8.9 | |
| | **8/11/2005** | **200** | **8.4** | **30** | **4.6** | **36** | |
| | | | | | | | |
| **MW-8A** | 4/27/2005 | 320 | 7.1 | 4.7 | 18 | 70 | |
| | **8/11/2005** | **600** | **25** | **47** | **28** | **130** | |
| | | | | | | | |
| **MW-8B** | 4/27/2005 | 38 | 2.1 | 7.6 | 1.5 | 8.9 | |
| | **8/11/2005** | **180** | **7.6** | **26** | **4.3** | **34** | |
| | | | | | | | |
| **G-1** | 10/15/1993 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| | | | | | | | |
| **G-3** | 10/15/1993 | 5/23/1907 | 200 | 32 | 9.4 | 37 | |

Table 5. Analytic Results for Ground Water - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

| Well ID | Date Sampled | TPPH/TPH (G) | Benzene | Toluene | Ethyl benzene | Xylenes | Notes |
|---|---|---|---|---|---|---|---|
| | | <---------- ppb ----------> | | | | | |
| **G-4** | 10/15/1993 | 100,000 | 17,000 | 13,000 | 4,200 | 21,000 | |
| **G-5** | 10/15/1993 | 81,000 | 5,600 | 8,800 | 3,300 | 18,000 | |
| **G-6** | 10/15/1993 | --- | --- | --- | --- | --- | |
| **G-7** | 10/15/1993 | 43,000 | 21,000 | 200 | 900 | 3,500 | |
| **G-8** | 10/15/1993 | 8,900 | 440 | <5.0 | 490 | 900 | |
| **G-9** | 10/15/1993 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| **G-10** | 10/15/1993 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| **G-11** | 10/15/1993 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| **G-12** | 10/15/1993 | <50 | <0.5 | 0.7 | <0.5 | <0.5 | |
| **G-13** | 10/15/1993 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| **G-14** | 2/9/1998 | 24,000 | 740 | 1,400 | 930 | 2,700 | |
| **G-15** | 2/9/1998 | 290,000 | 5,100 | 32,000 | 5,100 | 29,000 | |
| **G-16** | 4/19/2000 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| **G-17** | 4/19/2000 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | |
| **CPT1@20'** | 10/16/2002 | 57,000 | 3,500 | 1,900 | 2,300 | 13,000 | |
| **CPT1@48'** | 10/16/2002 | 210 | 4.1 | 1.8 | 6 | 21 | |
| **CPT1@64'** | 10/16/2002 | <50 | <0.5 | <0.5 | 0.53 | 1.9 | |
| **CPT2@50'** | 10/16/2003 | <50 | 2.2 | 1.8 | 1.3 | 4.7 | |
| **CPT2@75'** | 10/16/2003 | <50 | <0.5 | <0.5 | <0.5 | <1 | |

Table 5. Analytic Results for Ground Water - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California

| Well ID | Date Sampled | TPPH/TPH (G) | Benzene | Toluene | Ethyl benzene | Xylenes | Notes |
|---|---|---|---|---|---|---|---|
| | | <---------- ppb ----------> | | | | | |
| | | | | | | | |
| **CPT3@45'** | 10/17/2003 | <50 | 0.79 | 1.4 | 0.54 | 2.3 | |
| **CPT3@73'** | 10/17/2003 | 1,300 | 230 | 110 | 91 | 280 | |
| | | | | | | | |
| **CPT4@45'** | 10/16/2003 | <50 | 0.72 | 0.93 | <0.5 | <1 | |
| **CPT4@80'** | 10/17/2003 | <50 | <0.5 | <0.5 | <0.5 | <1 | |

**Explanation:**

TPPH(G) = Total Purgeable Petroleum Hydrocarbons as Gasoline
ppb = parts per billion
--- = Not analyzed/Not applicable

Table 6. Analytical Results for Ground Water - Oxygenates - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California.

| Sample ID | Sample Date | t-Butyl alcohol (TBA) | MTBE | Diisopropyl ether (DIPE) | Ethyl t-butyl ether (ETBE) | t-Amyl methyl ether (TAME) | Notes |
|---|---|---|---|---|---|---|---|
| | | <----------ppb----------> | | | | | |
| **MW-1** | 9/14/1998 | <250 | 320,000 | <250 | <250 | <50 | |
| | 3/25/1999 | --- | 320,000 | --- | --- | --- | |
| | 9/9/1999 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | | | | | | | |
| **MW-1A** | 3/26/2001 | 800 | 1,400 | <5.0 | <5.0 | <5.0 | |
| | 6/19/2001 | <1,000 | 6,600 | <250 | <250 | <250 | |
| | 9/7/2001 | <2,000 | 6,400 | <500 | <500 | <500 | |
| | 12/4/2001 | <1,000 | 4,300 | <250 | <250 | <250 | |
| | 2/26/2002 | <2,000 | 3,400 | <500 | <500 | <500 | |
| | 5/17/2002 | <2,000 | 3,100 | <10 | <10 | <10 | |
| | 8/29/2002 | <1,000 | 4,600 | <250 | <250 | <250 | |
| | 11/26/2002 | 300 | 4,700 | <1 | <1 | 18 | |
| | 2/20/2003 | <200 | 1,700 | <1 | <1 | 5 | |
| | 5/23/2003 | <200 | 850 | <1 | <1 | 2 | |
| | 8/20/2003 | 670 | 1,300 | <1 | <1 | 4 | |
| | 11/20/2003 | 1,400 | 120 | <25 | <25 | <25 | |
| | 5/12/2004 | 1,200 | 8.2 | <25 | <25 | <25 | |
| | 11/10/2004 | 1,300 | 8.5 | <25 | <25 | <25 | |
| | 5/11/2005 | 1,200 | 14 | <25 | <25 | <25 | |
| | | | | | | | |
| **MW-2** | 9/9/1999 | --- | --- | --- | --- | --- | Separate phase product present in well. |
| | | | | | | | |
| **MW-2A** | 3/26/2001 | 1,500 | 2,800 | <500 | <500 | <500 | |
| | 6/19/2001 | <1,000 | 4,200 | <250 | <250 | <250 | |
| | 9/7/2001 | <2,000 | 5,000 | <500 | <500 | <500 | |
| | 12/4/2001 | <400 | 3,100 | <100 | <100 | <100 | |
| | 2/26/2002 | 300 | 2,600 | <50 | <50 | <50 | |
| | 5/17/2002 | <2,000 | 2,200 | <10 | <10 | <10 | |
| | 8/29/2002 | <1,000 | 4,600 | <250 | <250 | <250 | |
| | 11/26/2002 | 210 | 2,000 | <1 | <1 | 6 | |
| | 2/20/2003 | <200 | 790 | <1 | <1 | 2 | |
| | 5/23/2003 | 240 | 1,800 | <1 | <1 | 5 | |
| | 8/20/2003 | 760 | 2,100 | <1 | <1 | 7 | |
| | 11/20/2003 | 660 | 270 | <50 | <50 | <50 | |

Table 6. Analytical Results for Ground Water - Oxygenates - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California.

| Sample ID | Sample Date | t-Butyl alcohol (TBA) | MTBE | Diisopropyl ether (DIPE) | Ethyl t-butyl ether (ETBE) | t-Amyl methyl ether (TAME) | Notes |
|---|---|---|---|---|---|---|---|
| | | <----------ppb----------> | | | | | |
| **MW-2A cont.** | 5/12/2004 | <200 | 77 | <100 | <100 | <100 | |
| | 11/10/2004 | 820 | 51 | <100 | <100 | <100 | |
| | 5/11/2005 | 260 | 31 | <100 | <100 | <100 | |
| | | | | | | | |
| **MW-3** | 9/14/1998 | <5 | <1 | <5 | <5 | <1 | |
| | 3/25/1999 | --- | 120,000 | --- | --- | --- | |
| | 9/9/1999 | --- | 74,000 | --- | --- | --- | |
| | 3/21/2000 | --- | 33,000 | --- | --- | --- | |
| | 10/2/2000 | --- | 75,000 | --- | --- | --- | |
| | 3/26/2001 | 3,900 | 28,000 | <500 | <500 | <500 | |
| | 6/19/2001 | <10,000 | 60,000 | <2,500 | <2,500 | <2,500 | |
| | 9/7/2001 | <10,000 | 47,000 | <2,500 | <2,500 | <2,500 | |
| | 12/4/2001 | <10,000 | 47,000 | <2,500 | <2,500 | <2,500 | |
| | 2/26/2002 | <10,000 | 41,000 | <2,500 | <2,500 | <2,500 | |
| | 5/17/2002 | <20,000 | 30,000 | <100 | <100 | <100 | |
| | 8/29/2002 | <10,000 | 33,000 | <2,500 | <2,500 | <2,500 | |
| | 11/26/2002 | 990 | 34,000 | <1 | <1 | 120 | |
| | 2/20/2003 | 1,200 | 27,000 | <1 | <1 | 110 | |
| | 5/23/2003 | 3,400 | 23,000 | <1 | <1 | 83 | |
| | 8/20/2003 | 12,000 | 49,000 | <10 | <10 | 110 | |
| | 11/20//03 | <4,000 | 18,000 | <2,000 | <2,000 | <2,000 | |
| | 5/12/2004 | 5,200 | 40,000 | <2,500 | <2,500 | <2,500 | |
| | 11/10/2004 | 5,000 | 12,000 | <2,000 | <2,000 | <2,000 | |
| | 5/11/2005 | 9,000 | 28,000 | <2,500 | <2,500 | <2,500 | |
| | | | | | | | |
| **MW-4** | 5/4/2000 | --- | <2.0 | --- | --- | --- | |
| | 10/2/2000 | --- | <0.5 | --- | --- | --- | |
| | 3/26/2001 | <10.0 | <2.0 | <5.0 | <5.0 | <5.0 | |
| | 6/19/2001 | <20 | <5.0 | <5.0 | <5.0 | <5.0 | |
| | 2/26/2002 | <20 | 5.3 | <5 | <5 | <5 | |
| | 5/24/2002 | <20 | <5 | <5 | <5 | <5 | |
| | 8/29/2002 | <20 | 38 | <5 | <5 | <5 | |
| | 11/26/2002 | <200 | 37 | <1 | <1 | <1 | |
| | 2/20/2003 | <200 | <1 | <1 | <1 | <1 | |

Table 6. Analytical Results for Ground Water - Oxygenates - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California.

| Sample ID | Sample Date | t-Butyl alcohol (TBA) | MTBE | Diisopropyl ether (DIPE) | Ethyl t-butyl ether (ETBE) | t-Amyl methyl ether (TAME) | Notes |
|---|---|---|---|---|---|---|---|
| | | <----------ppb----------> | | | | | |
| **MW-4 cont.** | 5/23/2003 | <200 | <1 | <1 | <1 | <1 | |
| | 8/20/2003 | <200 | <1 | <1 | <1 | <1 | |
| | 11/20/2003 | <10 | 1.6 | <5 | <5 | <5 | |
| | 5/12/2004 | <10 | <1 | <5 | <5 | <5 | |
| | 11/10/2004 | <10 | <1 | <5 | <5 | <5 | |
| | 5/11/2005 | <10 | <1 | <5 | <5 | <5 | |
| | | | | | | | |
| **MW-5** | 11/26/2002 | <200 | 1 | <1 | <1 | <1 | |
| | 2/20/2003 | <200 | <1 | <1 | <1 | <1 | |
| | 5/23/2003 | <200 | <1 | <1 | <1 | <1 | |
| | 8/20/2003 | — | — | — | — | --- | |
| | 11/20/2003 | <10 | <1 | <5 | <5 | <5 | |
| | 2/23/2004 | <10 | 1.4 | <5 | <5 | <5 | |
| | 5/12/2004 | <10 | 1.2 | <5 | <5 | <5 | |
| | 8/23/2004 | <10 | <1 | <5 | <5 | <5 | |
| | 11/10/2004 | <10 | <1 | <5 | <5 | <5 | |
| | 2/22/2005 | <10 | <1 | <5 | <5 | <5 | |
| | 5/11/2005 | <10 | 1.1 | <5 | <5 | <5 | |
| | **8/11/2005** | **<10** | **<1.0** | **<5.0** | **<5.0** | **<5.0** | |
| | | | | | | | |
| **MW-6** | 11/26/2002 | <200 | <1 | <1 | <1 | <1 | |
| | 2/20/2003 | <200 | <1 | <1 | <1 | <1 | |
| | 5/23/2003 | <200 | <1 | <1 | <1 | <1 | |
| | 8/20/2003 | <200 | <1 | <1 | <1 | <1 | |
| | 11/20/2003 | <10 | 4.2 | <5 | <5 | <5 | |
| | 2/23/2004 | <10 | 5.8 | <5 | <5 | <5 | |
| | 5/12/2004 | <10 | <1 | <5 | <5 | <5 | |
| | 8/23/2004 | <10 | <1 | <5 | <5 | <5 | |
| | 11/10/2004 | <10 | <1 | <5 | <5 | <5 | |
| | 2/22/2005 | <10 | <1 | <5 | <5 | <5 | |
| | 5/11/2005 | <20 | <2 | <10 | <10 | <10 | |
| | **8/11/2005** | **<10** | **<1.0** | **<5.0** | **<5.0** | **<5.0** | |

Table 6. Analytical Results for Ground Water - Oxygenates - Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California.

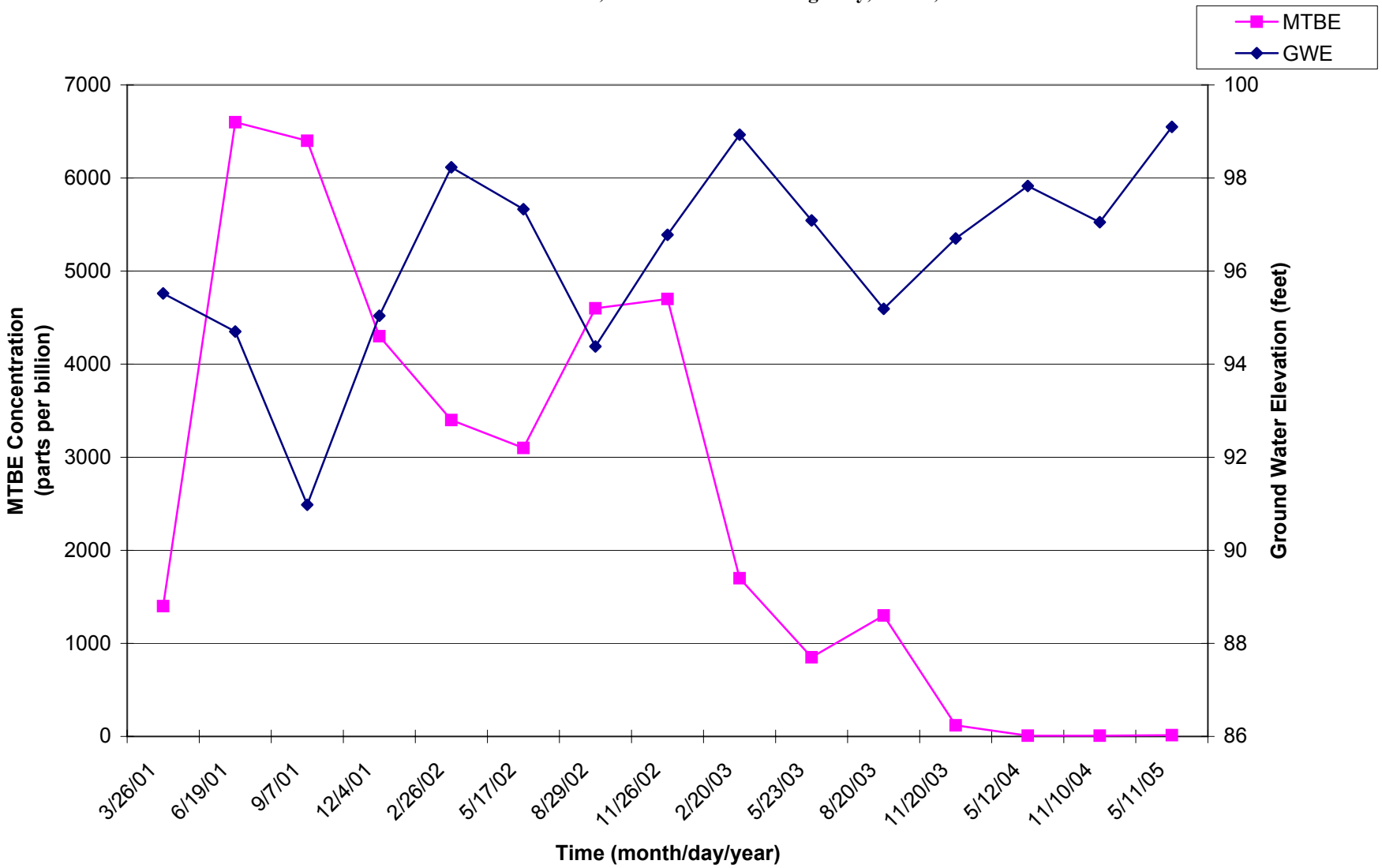
| Sample ID | Sample Date | t-Butyl alcohol (TBA) | MTBE | Diisopropyl ether (DIPE) | Ethyl t-butyl ether (ETBE) | t-Amyl methyl ether (TAME) | Notes |
|---|---|---|---|---|---|---|---|
| | | <----------ppb----------> | | | | | |
| **MW-7A** | 4/27/2005 | <5,000 | 24,000 | <2500 | <2,500 | <2,500 | |
| | **8/11/2005** | **<10,000** | **29,000** | **<5,000** | **<5,000** | **<5,000** | |
| **MW-7B** | 4/27/2005 | <10 | 12 | <5 | <5 | <5 | |
| | **8/11/2005** | **<10** | **23** | **<5.0** | **<5.0** | **<5.0** | |
| **MW-8A** | 4/27/2005 | <10 | 2.1 | <5 | <5 | <5 | |
| | **8/11/2005** | **<10** | **13** | **<5.0** | **<5.0** | **<5.0** | |
| **MW-8B** | 4/27/2005 | <10 | 1.3 | <5 | <5 | <5 | |
| | **8/11/2005** | **<10** | **8.6** | **<5.0** | **<5.0** | **<5.0** | |
| **CPT1@20'** | 10/16/2002 | <4,000 | 31,000 | <2,000 | <2,000 | <2,000 | |
| **CPT1@48'** | 10/16/2002 | <10 | 99 | <5 | <5 | <5 | |
| **CPT1@64'** | 10/16/2002 | <10 | 10 | <5 | <5 | <5 | |
| **CPT2@50'** | 10/16/2003 | <10 | <1 | <5 | <5 | <5 | |
| **CPT2@75'** | 10/16/2003 | <10 | <1 | <5 | <5 | <5 | |
| **CPT3@45'** | 10/17/2003 | <10 | 28 | <5 | <5 | <5 | |
| **CPT3@73'** | 10/17/2003 | 190 | 670 | <50 | <50 | <50 | |
| **CPT4@45'** | 10/16/2003 | <10 | <1 | <5 | <5 | <5 | |
| **CPT4@80'** | 10/17/2003 | <10 | <1 | <5 | <5 | <5 | |

**Explanation:**

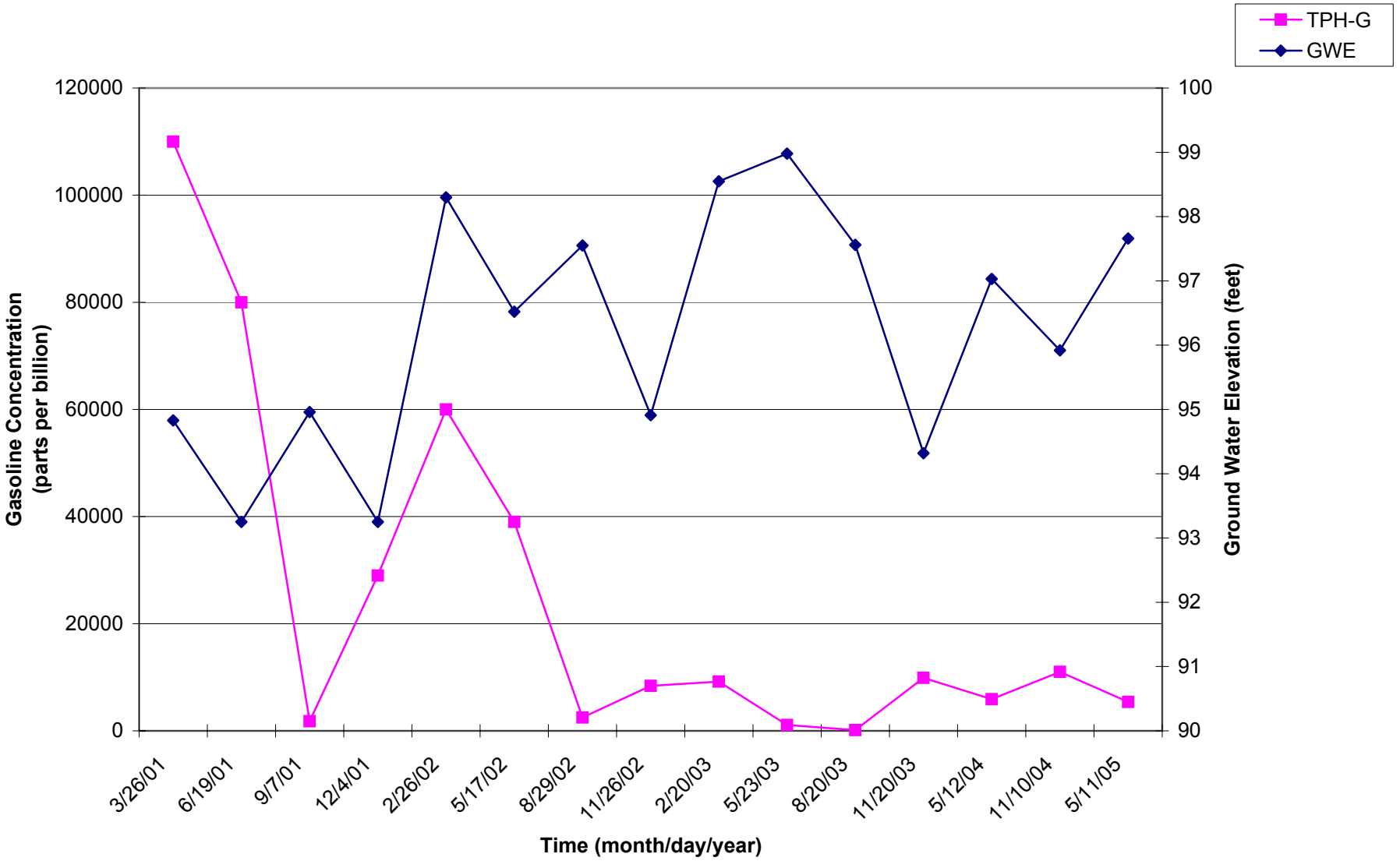
MTBE = Methyl tertiary-butyl ether

--- = Not analyzed/Not detected

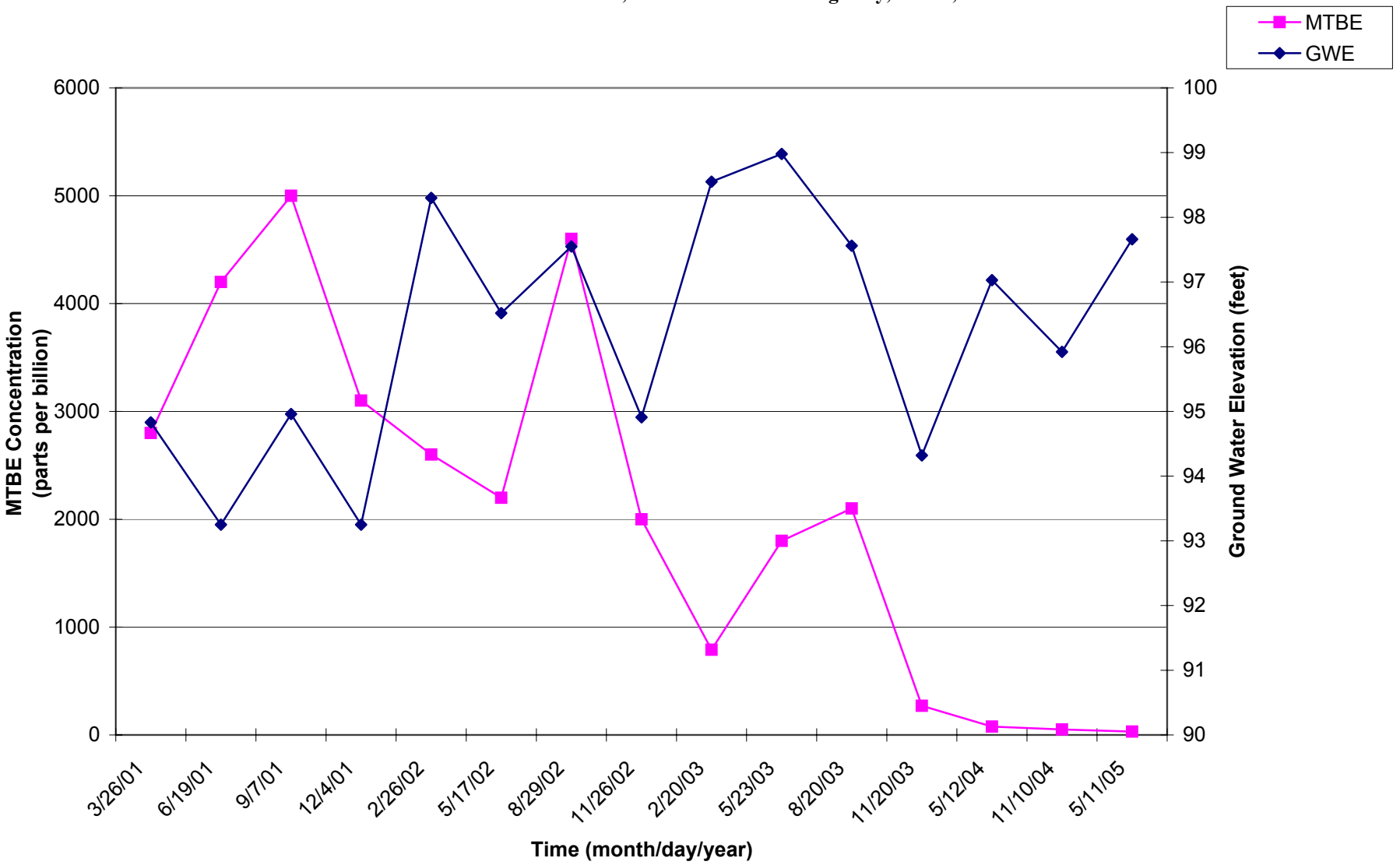
**Graph 2: MW-1A: MTBE Concentration and Ground Water Elevation vs. Time**
**- Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California**



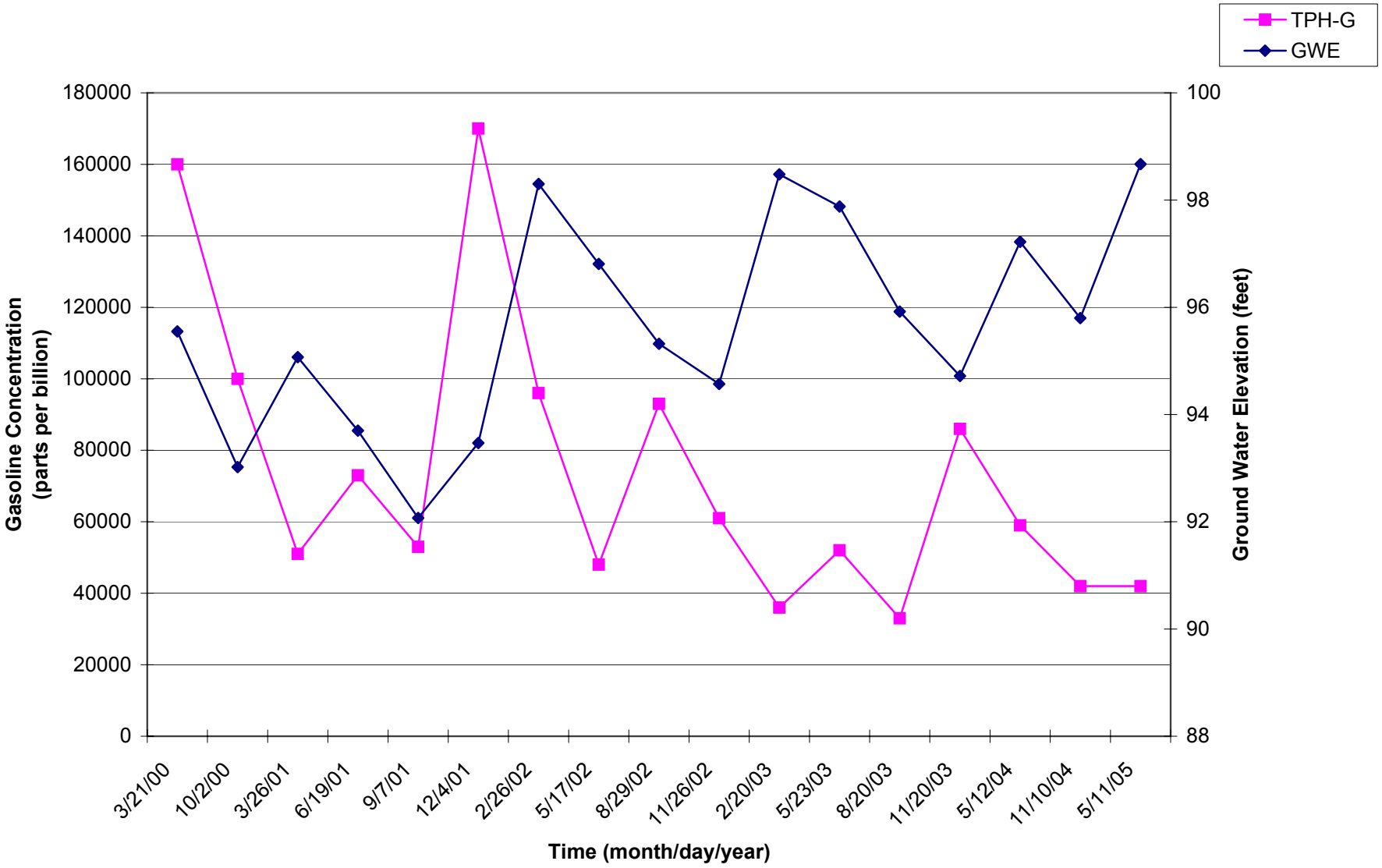
**Graph 3: MW-2A: Gasoline Concentration and Ground Water Elevation vs. Time**
**- Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California**



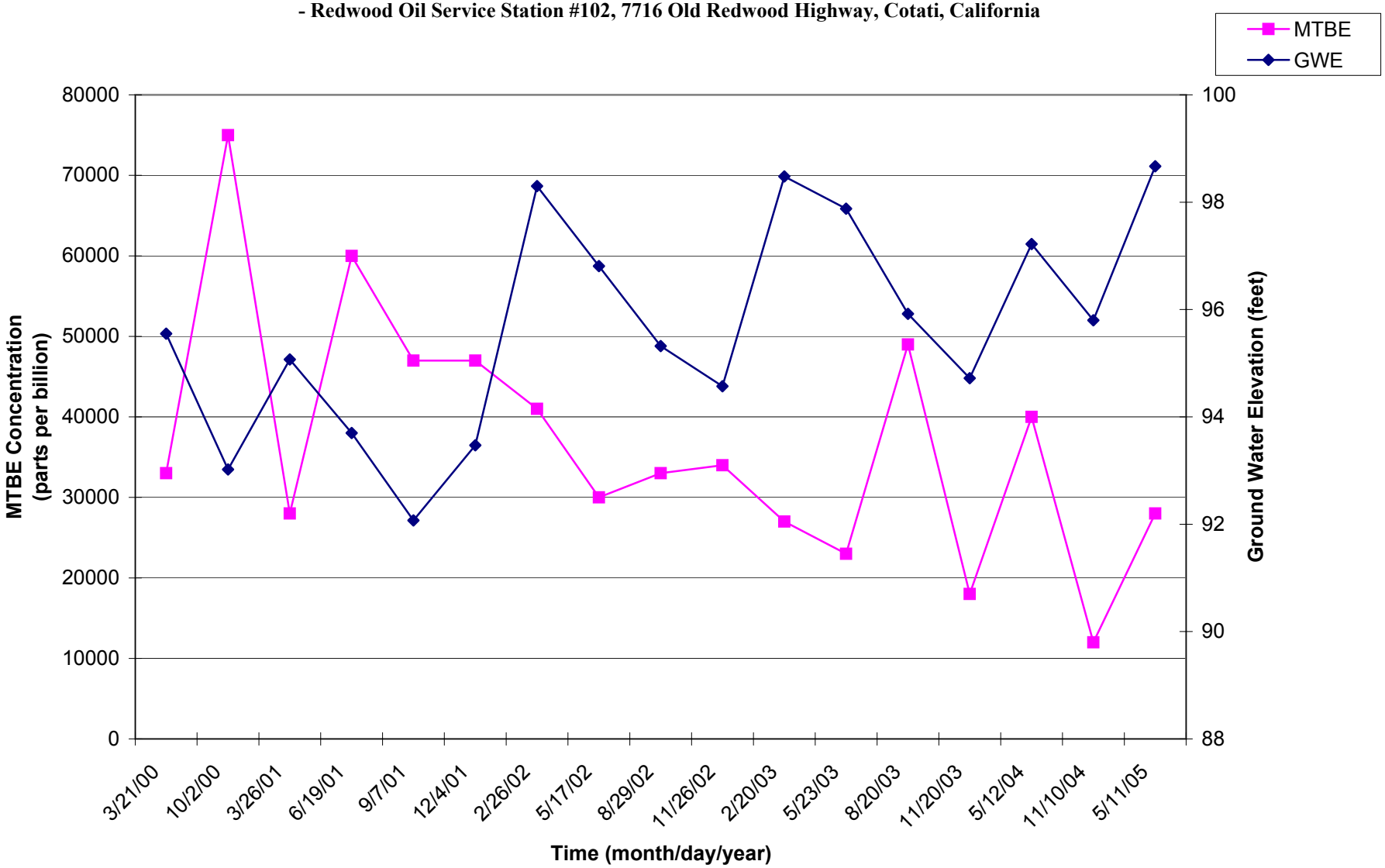
**Graph 4: MW-2A: MTBE Concentration and Ground Water Elevation vs. Time**
**- Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California**



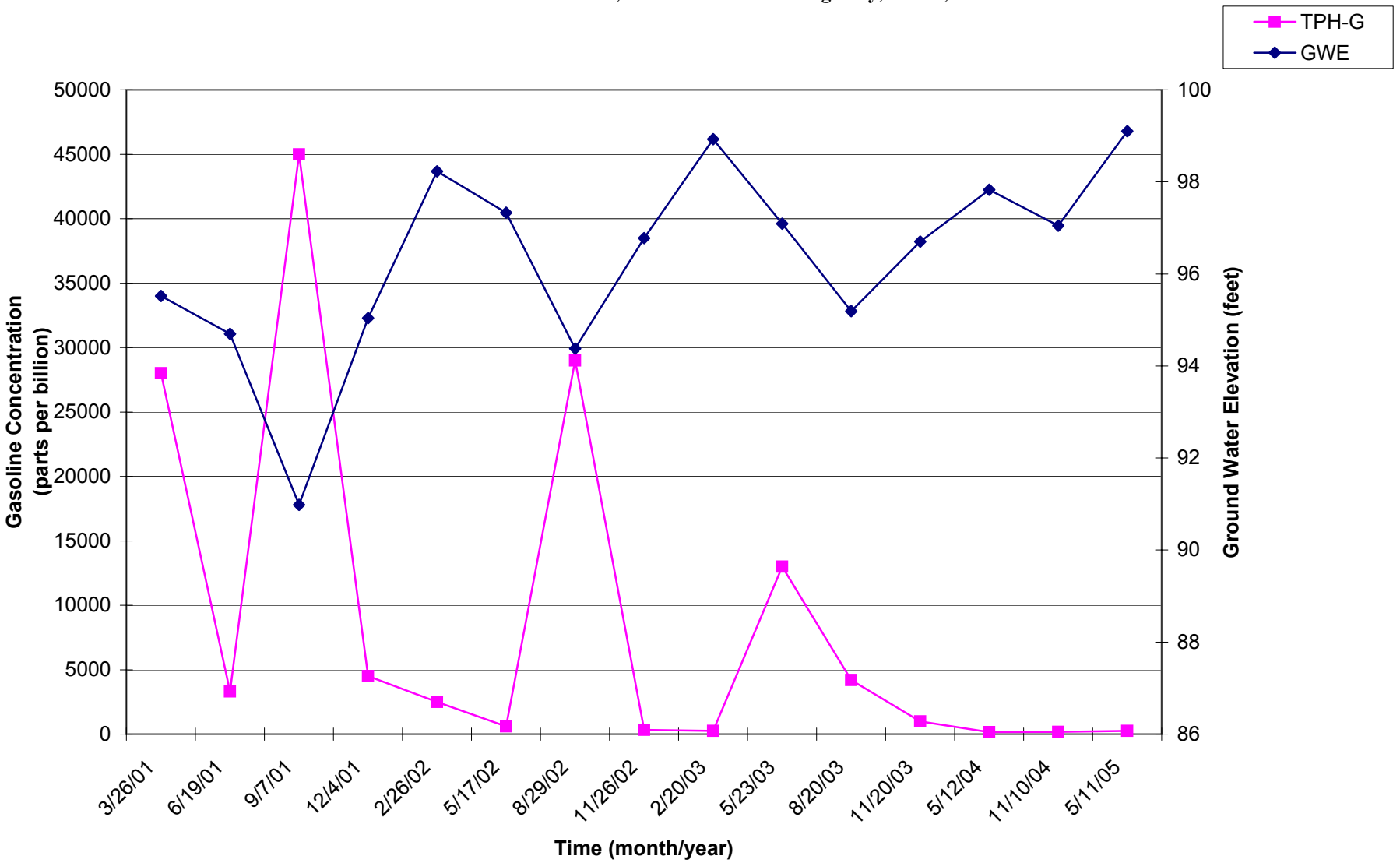
**Graph 5: MW-3: Gasoline Concentration and Ground Water Elevation vs. Time**
**- Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California**



**Graph 6: MW-3: MTBE Concentration and Ground Water Elevation vs. Time**
**- Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California**



**Graph 1: MW-1A: Gasoline Concentration and Ground Water Elevation vs. Time**
**- Redwood Oil Service Station #102, 7716 Old Redwood Highway, Cotati, California**



Calculation 1: Estimate of Hydrocarbon Mass in Soil

The following assumptions have been made to calculate the mass of hydrocarbons in soil:

1.) Approximate area of impacted soil in saturated zone ≅ 100 ft x 100 ft (approx. 10,000 $ft^2$).
2.) Approximate vertical extent of impacted soil in saturated zone is 8 ft to 12 ft bgs.
3.) Approximate area of impacted soil in unsaturated zone is 90 ft x 10 ft (approx. 900 $ft^2$).
4.) Approximate vertical extent of impacted soil in unsaturated zone is 4 ft to 8 ft bgs.
5.) Approximate mass of impacted soil is 1,800 kg/cubic yard.
6.) 27 samples (from Table 2, Appendix B) located within the saturated impacted area are assumed to be representative. All samples are between the depths of 8 and 10 ft bgs. Samples are: OXS-2 through OXS-4; OXS-8 through OXS-15; and OXS-17 through OXS-32.
7.) Six samples (from Table 2, Appendix B) located at the border of the unsaturated impacted area are assumed to be representative. Samples are OXS-27 through OXS-32

Approximate volume of impacted soil in the saturated zone is calculated to be 1,500 CY.
Approximate mass of impacted soil in the saturated zone is calculated to be $2.7 \times 10^6$ kg.
Approximate volume of impacted soil in the unsaturated zone is calculated to be 130 CY.
Approximate mass of impacted soil in the unsaturated zone is calculated to be $2.4 \times 10^5$ kg.

Average concentration of hydrocarbons in saturated soil, based on gasoline concentrations of the 27 representative samples, is calculated to be 3,200 mg/kg.
Average concentration of hydrocarbons in unsaturated soil, based on gasoline concentrations of the 6 representative samples, is calculated to be 3,000 mg/kg.

Total estimated mass of hydrocarbons in saturated soil:

$2.7 \times 10^6$ kg soil x 3,200 mg/kg ≅ 8,600 kg

Total estimated mass of hydrocarbons in unsaturated soil:

$2.4 \times 10^5$ kg soil x 3,000 mg/kg ≅ 720 kg

Total estimated mass of hydrocarbons at site ≅ 9,300 kg

As an order of magnitude estimate, this figure should be considered to have an accuracy of no greater than 50%. The possible estimated mass of hydrocarbons in soil should therefore be expressed as a range of between 4,500 kg and 14,000 kg.

Calculation 2: Estimate of Hydrocarbon Mass in Groundwater

The following assumptions have been made to calculate the mass of hydrocarbons in groundwater:

1.) Approximate area of groundwater plume = 200 ft x 200 ft (Approx. 4,000 $ft^2$).
2.) Approximate vertical extent of groundwater plume, based on data from MW-7 and MW-8 (Table 4, Appendix B) is 5 ft to 60 ft bgs.
3.) Average concentration of hydrocarbons as gasoline in the groundwater plume, based on most recent data from MW-1A, MW-2A, MW-3, MW-7A, and MW-8A (Table 5, Appendix A) is 14,500 ppb (µg/l).
4.) Average porosity of plume, based on variable soil types, is assumed to be 0.35.

Total volume of groundwater in plume is approximately $2.2 \times 10^6$ liters.

Total mass of hydrocarbons in groundwater:

$2.2 \times 10^6$ liters x 14,500 µg/l ≅ 32 kg.

# APPENDIX C
# GROUNDWATER ELEVATION CONTOUR MAPS

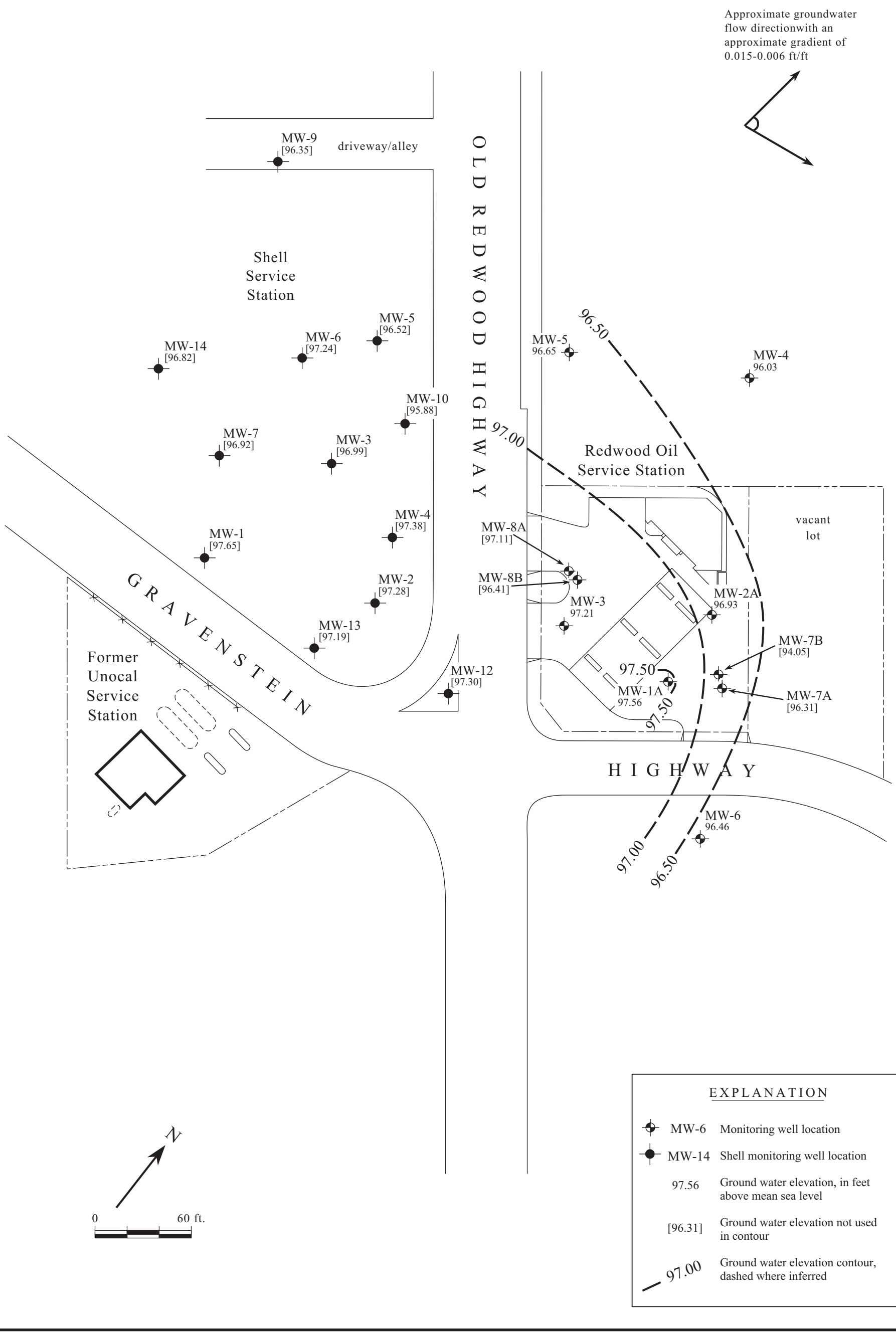



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - August 11, 2005 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-14 [GW 8-05] 9/29/05

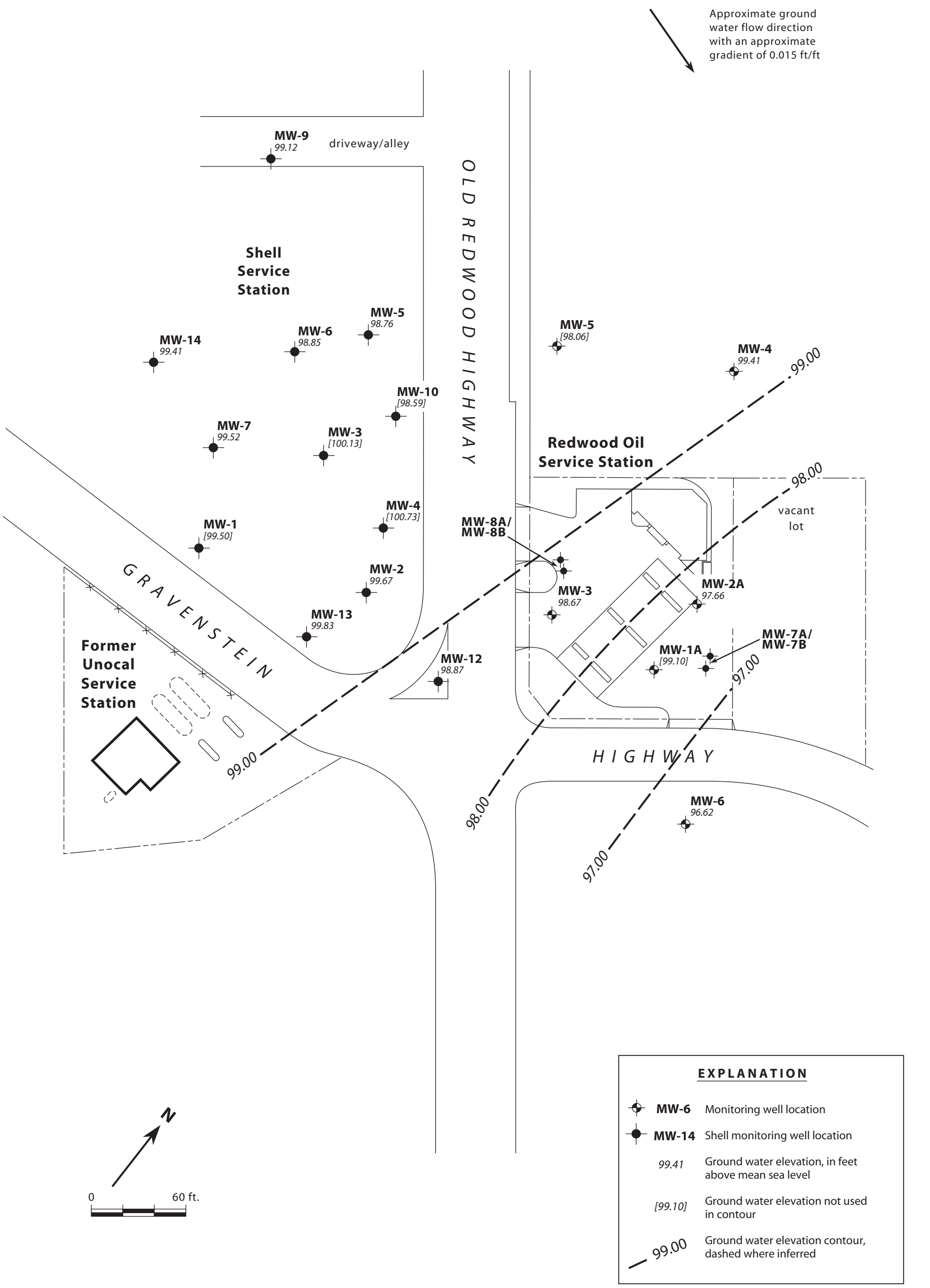



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - May 11, 2005 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-14 [GW 5-05] 7/14/05

Approximate ground water flow direction with an approximate gradient of 0.008 ft/ft

driveway/alley

**MW-9** *98.67*

OLD REDWOOD HIGHWAY

**Shell Service Station**

**MW-14** *99.86*

**MW-6** *98.65*

**MW-5** *98.63*

**MW-10** *98.98*

**MW-7** *99.94*

**MW-3** *100.59*

**MW-4** *100.87*

**MW-1** *98.75*

**MW-2** *99.38*

**MW-13** *100.32*

GRAVENSTEIN

**Former Unocal Service Station**

**MW-12** *97.82*

*100.00*

**MW-5** *99.57*

**MW-4** *100.52*

**Redwood Oil Service Station**

*100.00*

vacant lot

*99.00* — *99.00*

**MW-3** *98.96*

**MW-2A** *98.83*

**MW-1A** *[99.93]*

HIGHWAY

*98.00* — *98.00*

**MW-6** *97.84*

N

0 60 ft.

**EXPLANATION**

| | |
|---|---|
| **MW-6** | Monitoring well location |
| **MW-14** | Shell monitoring well location |
| *98.96* | Ground water elevation, in feet above mean sea level |
| *[99.93]* | Ground water elevation not used in contour map |
| 98.00 | Ground water elevation contour, dashed where inferred |

Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - February22, 2005 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-04 [GW 2-05] 04/26/05

Approximate ground water flow direction with an approximate gradient of 0.003 ft/ft

MW-9
95.56

driveway/alley

OLD REDWOOD HIGHWAY

Shell Service Station

MW-5
95.84

MW-6
95.69

MW-14
95.48

MW-10
95.52

MW-7
95.62

MW-3
96.34

MW-4
96.60

MW-1
95.83

MW-2
96.34

MW-13
96.10

MW-12
95.88

GRAVENSTEIN

Former Unocal Service Station

MW-5
95.95

MW-4
[95.27]

Redwood Oil Service Station

vacant lot

MW-3
95.80

MW-2A
95.92

95.75

95.75

MW-1A
[97.05]

HIGHWAY

95.50

95.50

MW-6
95.41

N

0 60 ft.

**EXPLANATION**

| | |
|---|---|
| **MW-6** | Monitoring well location |
| **MW-14** | Shell monitoring well location |
| *95.80* | Ground water elevation, in feet above mean sea level |
| *[97.05]* | Ground water elevation not used in contour map |
| 95.50 | Ground water elevation contour, dashed where inferred |

Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - November10, 2004 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-04 [GW 11-04] 01/11/05

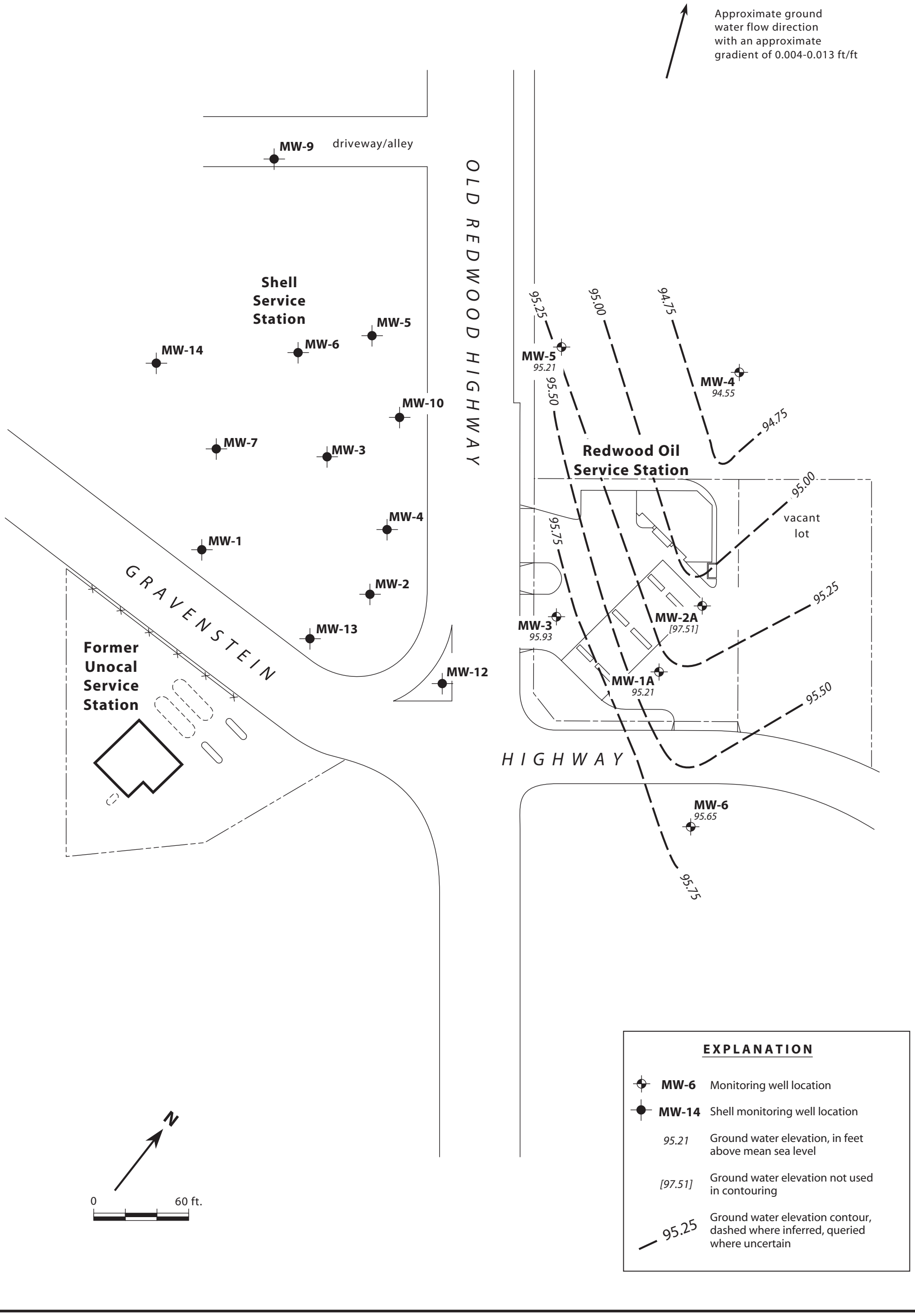



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - August 23, 2004 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-04 [GW 8_04 new] 10_04

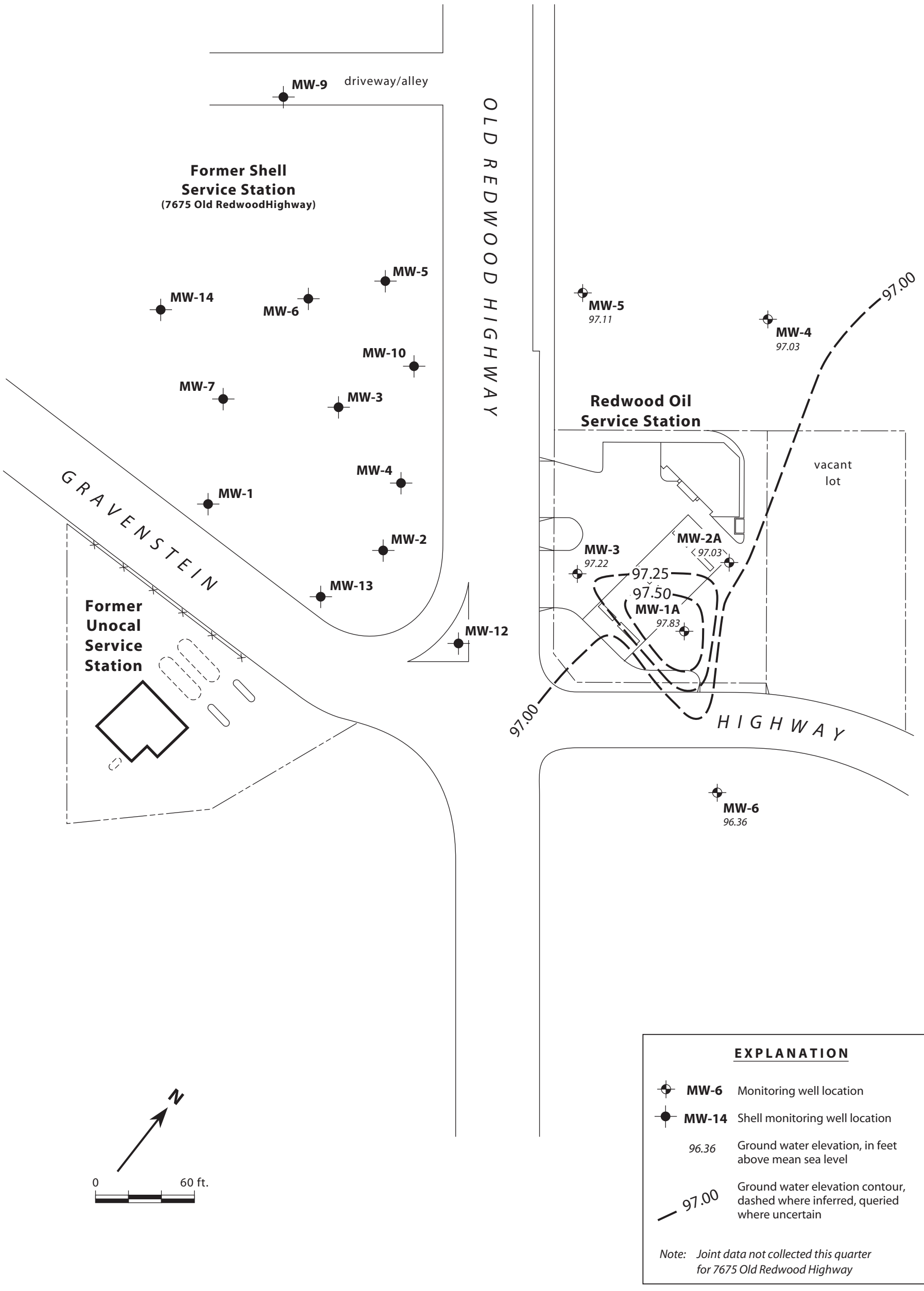



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - May 12, 2004 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

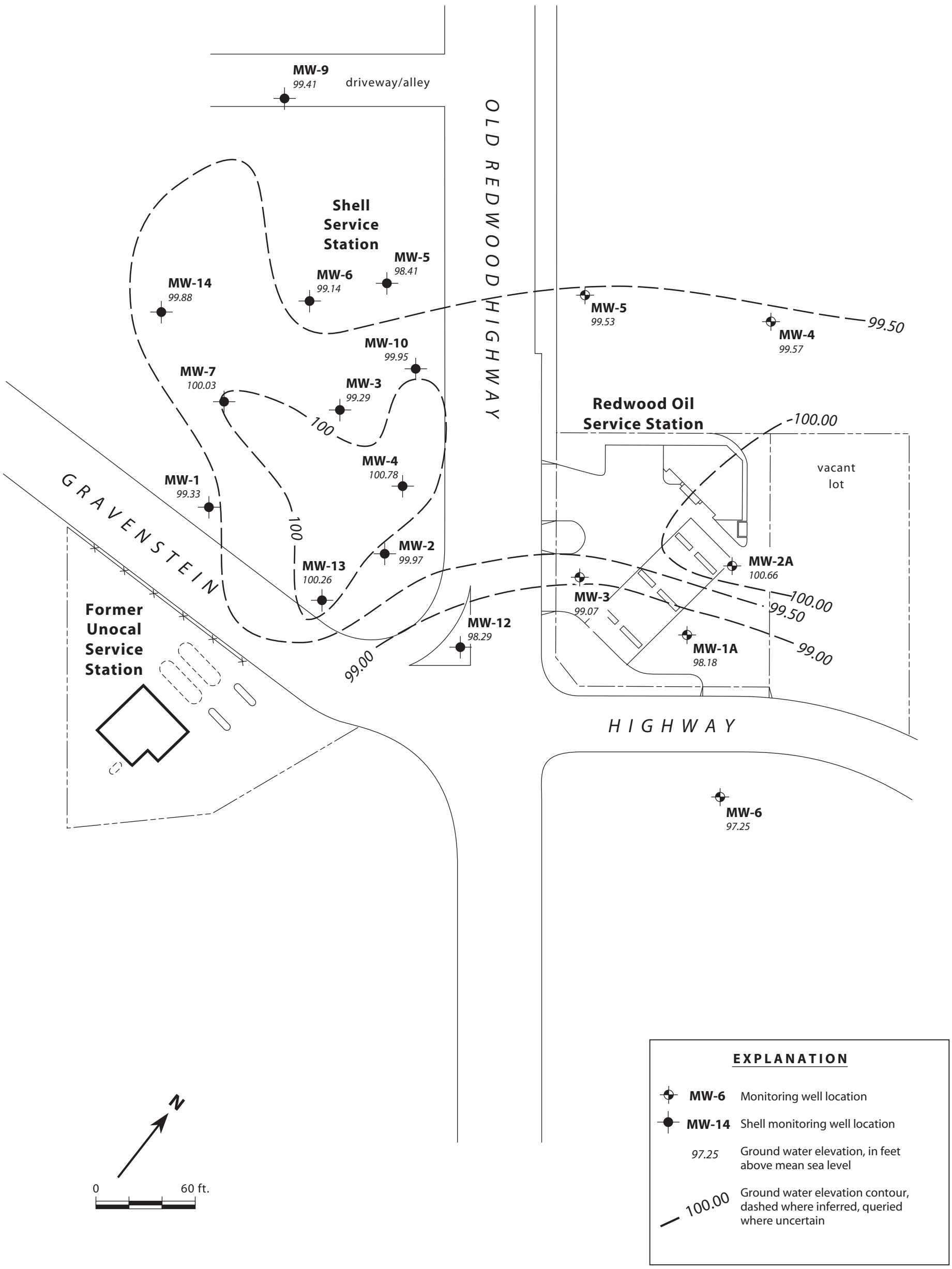



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - February 23, 2004 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-04 [GW Map 2_04] 5/04

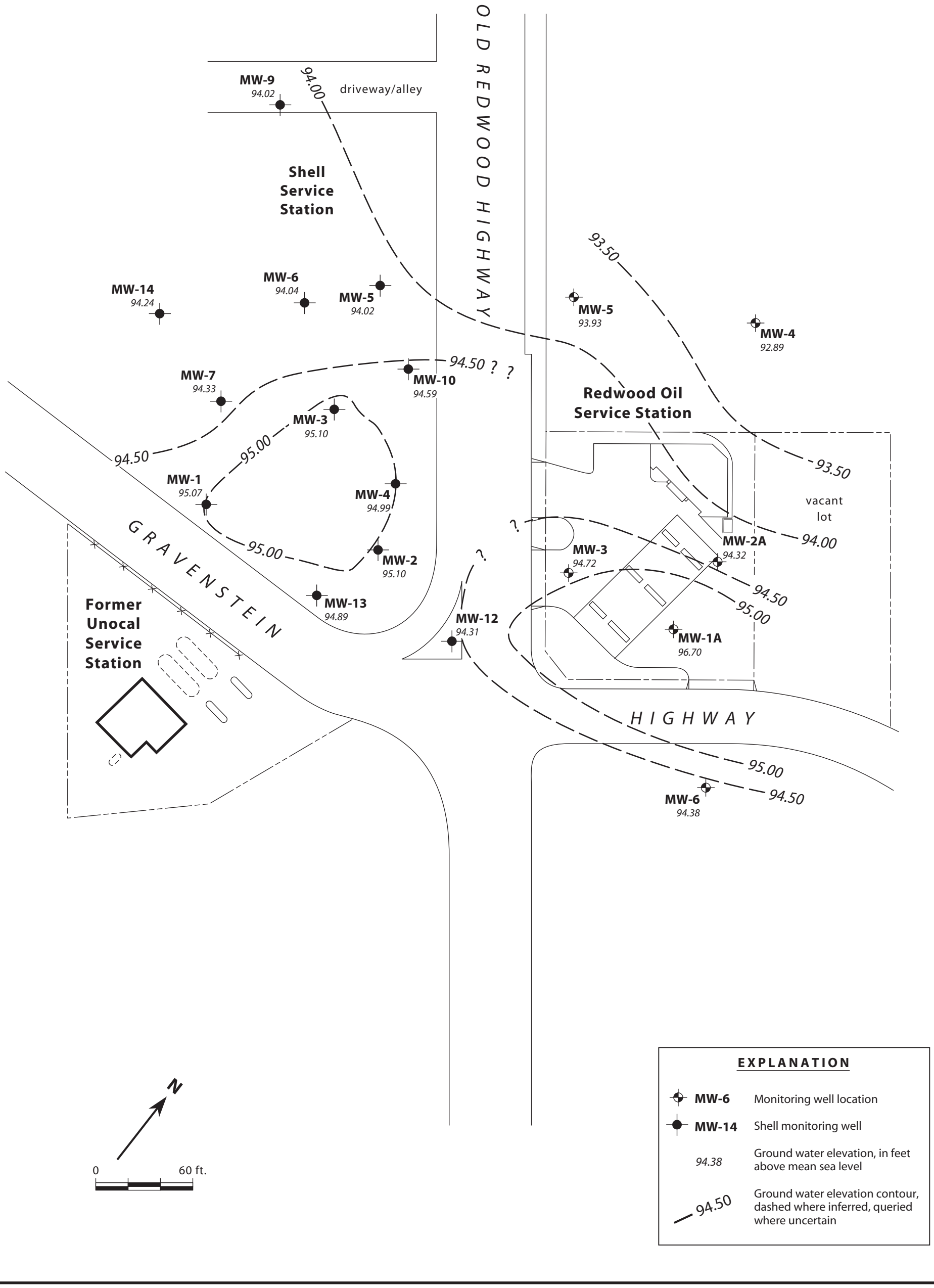



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - November 20, 2003 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-04 [GW Map 11_03] 1/04

Approximate ground water flow direction with an approximate gradient of 0.002 to 0.02 ft/ft

**MW-9** *95.23*

driveway/alley

**Shell Service Station**

OLD REDWOOD HIGHWAY

**MW-5** *95.24*

**MW-14** *95.42*

**MW-6** *95.51*

**MW-10** *95.95*

**MW-7** *95.48*

**MW-3** *96.01*

**MW-4** *96.06*

**MW-1** *95.50*

**MW-2** *95.93*

**MW-13** *95.75*

**MW-12** *95.81*

GRAVENSTEIN

95.50

96

Former Unocal Service Station

**MW-5** *N/A*

**MW-4** *94.49*

**Redwood Oil Service Station**

95.50

96.00

96.50

97.00

vacant lot

**MW-2A** *97.56*

**MW-3** *95.92*

**MW-1A** *[95.19]*

97.00

96.50 HIGHWAY

96.00

**MW-6** *95.77*

N

0 60 ft.

**EXPLANATION**

| | |
|---|---|
| **MW-6** | Monitoring well location |
| **MW-14** | Shell monitoring well |
| *95.77* | Ground water elevation, in feet above mean sea level |
| *[95.19]* | Ground water elevation not used in contouring |
| 97.00 | Ground water elevation contour, dashed where inferred, queried where uncertain |

Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - August 20, 2003 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-04 [GW 8_03] 11/12/03

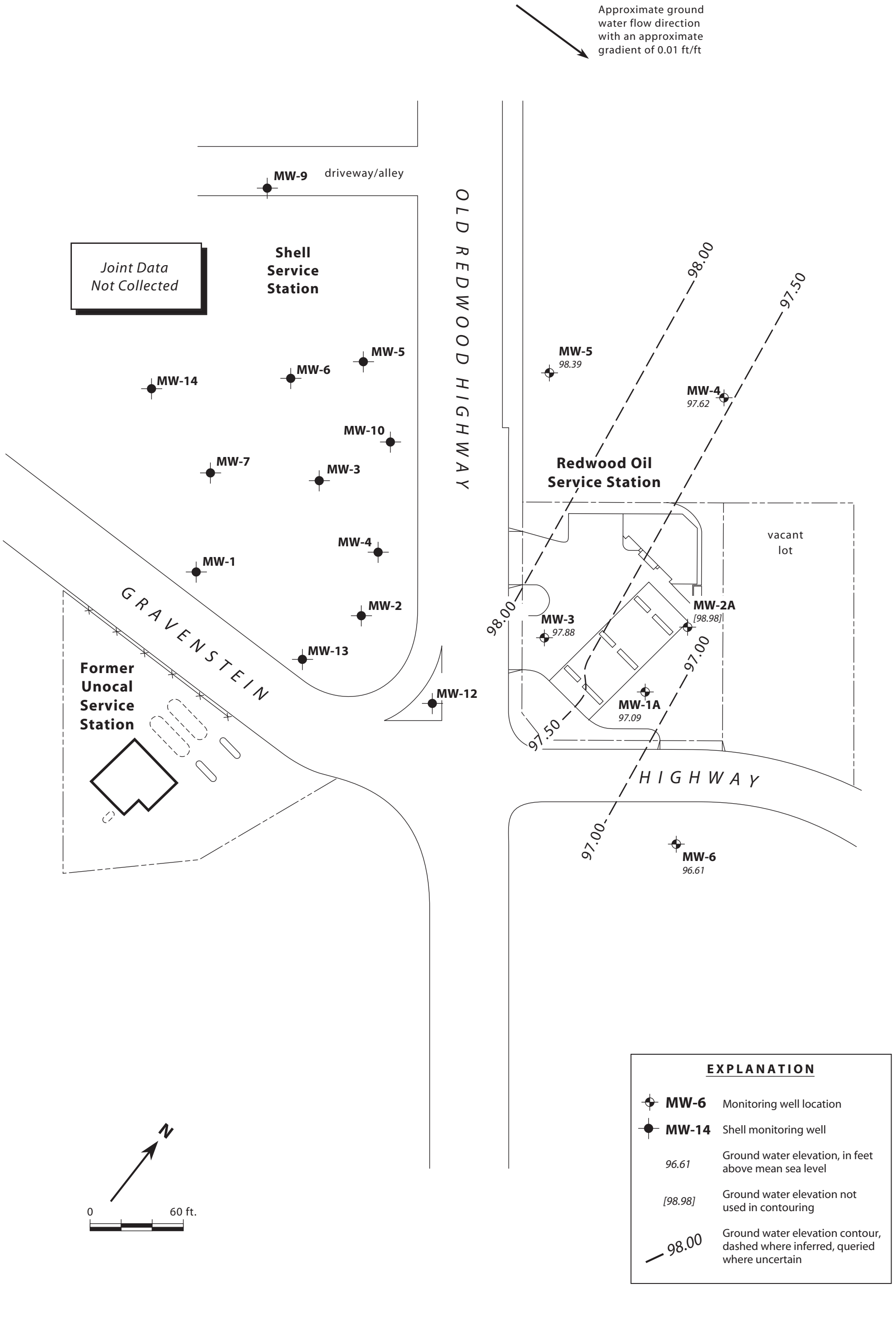



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - May 23, 2003 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

98-516-04 [GW map5-03] 7/16/03

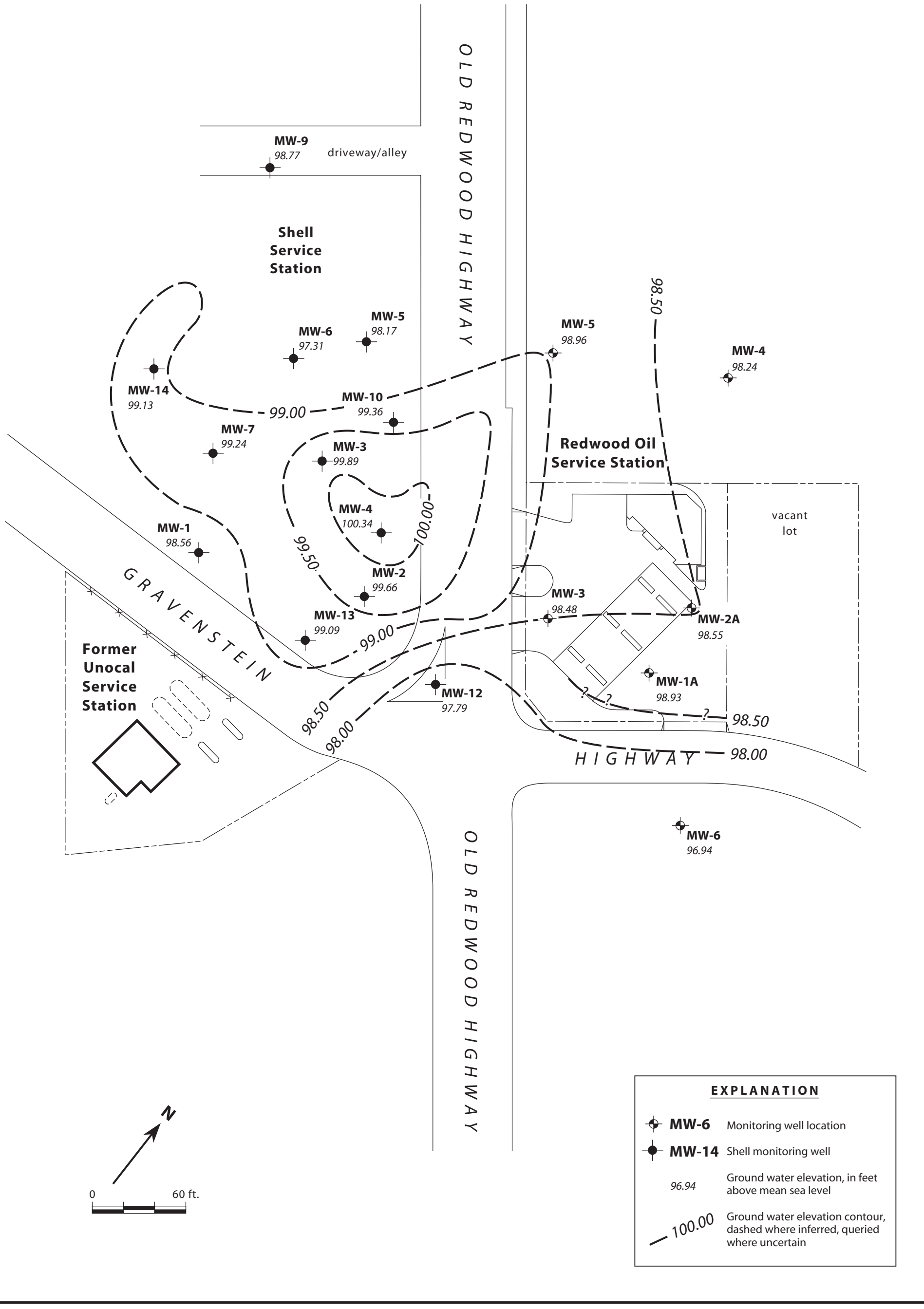



Figure 2. Monitoring Well Locations and Ground Water Elevation Contour Map - February 20, 2003 - Redwood Oil Service Station #102, 7716 Old Redwood, Cotati, California

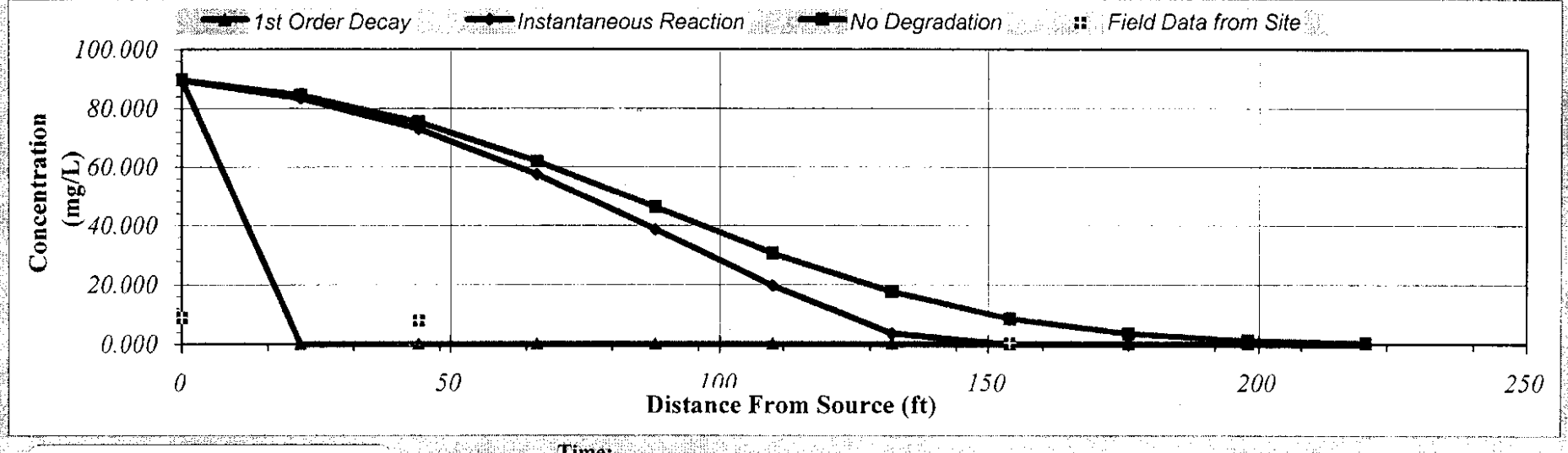
98-516-04 [GW 2_03] 5/05/03

# APPENDIX D

# BIOSCREEN MODELING RESULTS

## DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

| | *Distance from Source (ft)* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***TYPE OF MODEL*** | 0 | 22 | 44 | 66 | 88 | 110 | 132 | 154 | 176 | 198 | 220 |
| **No Degradation** | 89.750 | 84.525 | 75.487 | 62.000 | 46.192 | 30.526 | 17.531 | 8.608 | 3.570 | 1.239 | 0.357 |
| **1st Order Decay** | 89.750 | 0.019 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Inst. Reaction** | 89.591 | 83.400 | 73.078 | 57.413 | 38.620 | 19.631 | 3.639 | 0.000 | 0.000 | 0.000 | 0.000 |
| *Field Data from Site* | 9.E+00 | | 8.E+00 | | | | | 5.E-01 | | | |




Calculate Next Timestep
Animation Prev Timestep

Time:
30 Years

Return to Input

Recalculate This Sheet

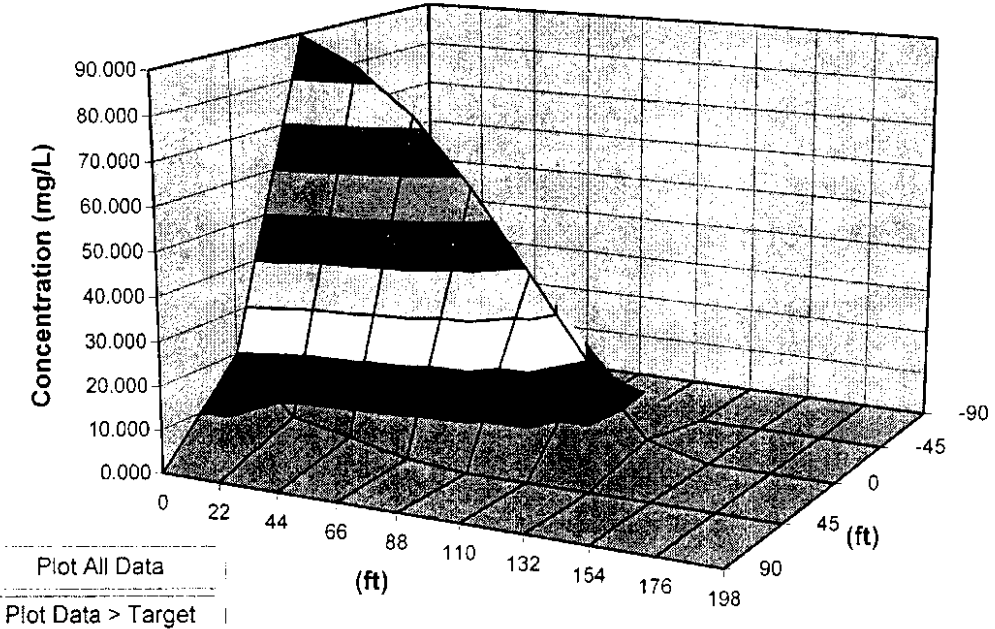
## DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

| Transverse Distance (ft) | Distance from Source (ft) 0 | 22 | 44 | 66 | 88 | 110 | 132 | 154 | 176 | 198 | 220 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| 45 | 2.E+01 | 7.E+00 | 4.E+00 | 1.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| 0 | 9.E+01 | 8.E+01 | 7.E+01 | 6.E+01 | 4.E+01 | 2.E+01 | 4.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| -45 | 2.E+01 | 7.E+00 | 4.E+00 | 1.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| -90 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| **MASS FLUX** (mg/day) | 2.E+03 | 2.E+03 | 2.E+03 | 1.E+03 | 9.E+02 | 5.E+02 | 8.E+01 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |

Time: **30 Years** Target Level: **0.005** mg/L Displayed Model: **Inst. Reaction**

*Model to Display:*

- *No Degradation Model*
- *1st Order Decay Model*
- *Instantaneous Reaction Model*




Plot All Data

Plot Data > Target

*Plume and Source Masses (Order-of-Magnitude Accuracy)*

| | | |
|---|---|---|
| Plume Mass if No Biodegradation | 37.1 | (Kg) |
| - Actual Plume Mass | 19.1 | (Kg) |
| = Plume Mass Removed by Biodeg | **18.1** | (Kg) (49 %) |

Change in Electron Acceptor/Byproduct Masses:

| *Oxygen* | *Nitrate* | *Iron II* | *Sulfate* | *Methane* | |
|---|---|---|---|---|---|
| -5.7 | -6.2 | +16.3 | -24.2 | +7.1 | (Kg) |

| | | |
|---|---|---|
| Contam. Mass in Source (t=0 Years) | 9300.0 | (Kg) |
| Contam. Mass in Source Now (t=30Years) | 9262.9 | (Kg) |
| Current Volume of Groundwater in Plume | 0.5 | (ac-ft) |
| Flowrate of Water Through Source Zone | 0.017 | (ac-ft/yr) |

**Mass HELP**

Recalculate

# BIOSCREEN Natural Attenuation Decision Support System

*Air Force Center for Environmental Excellence* — *Version 1.4*

Cotati Chevron
*Run Name*

**Data Input Instructions:**
115 — *1. Enter value directly... or*
↑ or
0.02 — *2. Calculate by filling in grey cells below. (To restore formulas, hit button below).*
Variable* — *Data used directly in model.*
20 — *Value calculated by model. (Don't enter any data).*

## 1. HYDROGEOLOGY

| | | | |
|---|---|---|---|
| Seepage Velocity* | *Vs* | 4.1 | *(ft/yr)* |
| *or* | | ↑ or | |
| Hydraulic Conductivity | *K* | 5.0E-05 | *(cm/sec)* |
| Hydraulic Gradient | *i* | 0.016 | *(ft/ft)* |
| Porosity | *n* | 0.2 | *(-)* |

## 2. DISPERSION

| | | | |
|---|---|---|---|
| Longitudinal Dispersivity* | *alpha x* | 11.7 | *(ft)* |
| Transverse Dispersivity* | *alpha y* | 1.2 | *(ft)* |
| Vertical Dispersivity* | *alpha z* | | *(ft)* |
| *or* | | ↑ or | |
| Estimated Plume Length | *Lp* | 220 | *(ft)* |

## 3. ADSORPTION

| | | | |
|---|---|---|---|
| Retardation Factor* | *R* | 1.3 | *(-)* |
| *or* | | ↑ or | |
| Soil Bulk Density | *rho* | 1.7 | *(kg/l)* |
| Partition Coefficient | *Koc* | 38 | *(L/kg)* |
| FractionOrganicCarbon | *foc* | 8.0E-4 | *(-)* |

## 4. BIODEGRADATION

| | | | |
|---|---|---|---|
| 1st Order Decay Coeff* | *lambda* | 6.9E+0 | *(per yr)* |
| *or* | | ↑ or | |
| Solute Half-Life | *t-half* | 0.10 | *(year)* |
| ***or Instantaneous Reaction Model*** | | | |
| Delta Oxygen* | *DO* | 5.78 | *(mg/L)* |
| Delta Nitrate* | *NO3* | 6.3 | *(mg/L)* |
| Observed Ferrous Iron* | *Fe2+* | 16.6 | *(mg/L)* |
| Delta Sulfate* | *SO4* | 24.6 | *(mg/L)* |
| Observed Methane* | *CH4* | 7.2 | *(mg/L)* |

## 5. GENERAL

| | | |
|---|---|---|
| Modeled Area Length* | 220 | *(ft)* |
| Modeled Area Width* | 180 | *(ft)* |
| Simulation Time* | 30 | *(yr)* |


## 6. SOURCE DATA

Source Thickness in Sat.Zone* 8 *(ft)*

Source Zones:

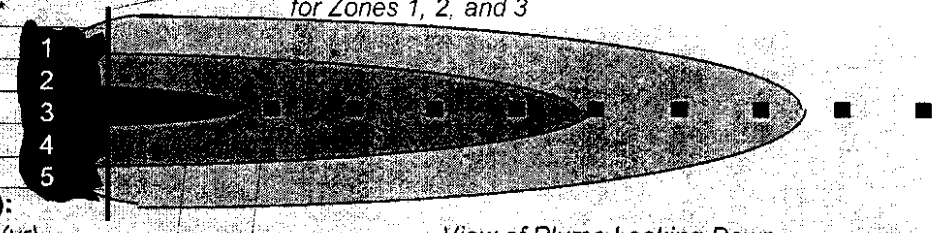
| | Width* (ft) | Conc. (mg/L)* |
|---|---|---|
| 1 | 10 | 0.07 |
| 2 | 25 | 20 |
| 3 | 40 | 90 |
| 4 | 25 | 20 |
| 5 | 10 | 0.07 |

**Source Halflife (see Help):**

| | | |
|---|---|---|
| >1000 | >1000 | *(yr)* |
| Inst. React. | ↑ 1st Order | |
| Soluble Mass | 9300 | *(Kg)* |

In Source NAPL, Soil

*Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3*




*View of Plume Looking Down*

*Observed Centerline Concentrations at Monitoring Wells*
*If No Data Leave Blank or Enter "0"*

## 7. FIELD DATA FOR COMPARISON

| Dist. from Source (ft) | Concentration (mg/L) |
|---|---|
| 0 | 9.0 |
| 22 | |
| 44 | 8.0 |
| 66 | |
| 88 | |
| 110 | |
| 132 | |
| 154 | .5 |
| 176 | |
| 198 | |
| 220 | |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

**RUN CENTERLINE** — View Output

**RUN ARRAY** — View Output

**Help**

Recalculate This Sheet

Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

# BIOSCREEN Natural Attenuation Decision Support System

*Air Force Center for Environmental Excellence* — *Version 1.4*

Cotati Chevron
*Run Name*

**Data Input Instructions:**
115 — *1. Enter value directly... or*
↑ or — *2. Calculate by filling in grey*
0.02 — *cells below. (To restore formulas, hit button below).*
Variable* — *Data used directly in model.*
20 — *Value calculated by model. (Don't enter any data).*

## 1. HYDROGEOLOGY

| | | | |
|---|---|---|---|
| Seepage Velocity* | *Vs* | 4.1 | *(ft/yr)* |
| ***or*** | | ↑ or | |
| Hydraulic Conductivity | *K* | 5.0E-05 | *(cm/sec)* |
| Hydraulic Gradient | *i* | 0.016 | *(ft/ft)* |
| Porosity | *n* | 0.2 | *(-)* |

## 2. DISPERSION

| | | | |
|---|---|---|---|
| Longitudinal Dispersivity* | *alpha x* | 11.7 | *(ft)* |
| Transverse Dispersivity* | *alpha y* | 1.2 | *(ft)* |
| Vertical Dispersivity* | *alpha z* | | *(ft)* |
| ***or*** | | ↑ or | |
| Estimated Plume Length | *Lp* | 220 | *(ft)* |

## 3. ADSORPTION

| | | | |
|---|---|---|---|
| Retardation Factor* | *R* | 1.3 | *(-)* |
| ***or*** | | ↑ or | |
| Soil Bulk Density | *rho* | 1.7 | *(kg/l)* |
| Partition Coefficient | *Koc* | 38 | *(L/kg)* |
| FractionOrganicCarbon | *foc* | 8.0E-4 | *(-)* |

## 4. BIODEGRADATION

| | | | |
|---|---|---|---|
| 1st Order Decay Coeff* | *lambda* | 6.9E+0 | *(per yr)* |
| ***or*** | | ↑ or | |
| Solute Half-Life | *t-half* | 0.10 | *(year)* |
| ***or Instantaneous Reaction Model*** | | | |
| Delta Oxygen* | *DO* | 5.78 | *(mg/L)* |
| Delta Nitrate* | *NO3* | 6.3 | *(mg/L)* |
| Observed Ferrous Iron* | *Fe2+* | 16.6 | *(mg/L)* |
| Delta Sulfate* | *SO4* | 24.6 | *(mg/L)* |
| Observed Methane* | *CH4* | 7.2 | *(mg/L)* |

## 5. GENERAL

| | | |
|---|---|---|
| Modeled Area Length* | 220 | *(ft)* |
| Modeled Area Width* | 180 | *(ft)* |
| Simulation Time* | 50 | *(yr)* |


## 6. SOURCE DATA

Source Thickness in Sat.Zone* 8 *(ft)*

Source Zones:

| | Width* (ft) | Conc. (mg/L)* |
|---|---|---|
| 1 | 10 | 0.07 |
| 2 | 25 | 20 |
| 3 | 40 | 90 |
| 4 | 25 | 20 |
| 5 | 10 | 0.07 |

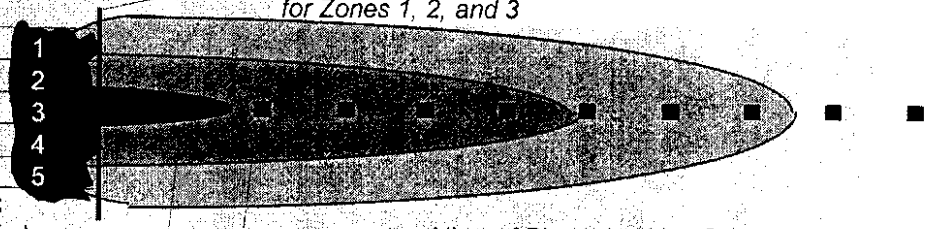
**Source Halflife (see Help):**

| >1000 | >1000 | *(yr)* |
|---|---|---|

Inst. Reactant ↑ 1st Order

Soluble Mass 9300 *(Kg)*
In Source NAPL, Soil

*Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3*




*View of Plume Looking Down*

*Observed Centerline Concentrations at Monitoring Wells*
*If No Data Leeve Blank or Enter "0"*

## 7. FIELD DATA FOR COMPARISON

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Concentration (mg/L) | 9.0 | | 8.0 | | | | | 5 | | | |
| Dist. from Source (ft) | 0 | 22 | 44 | 66 | 88 | 110 | 132 | 154 | 176 | 198 | 220 |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

**RUN CENTERLINE** — View Output

**RUN ARRAY** — View Output

**Help**

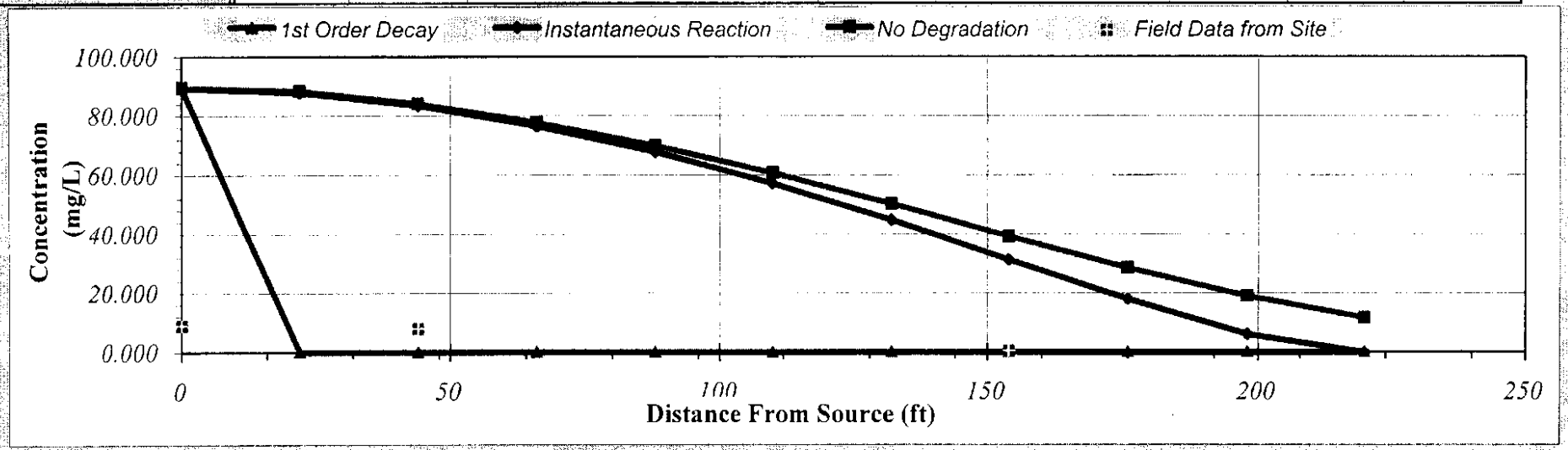
Recalculate This Sheet

Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

## DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

| | *Distance from Source (ft)* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***TYPE OF MODEL*** | 0 | 22 | 44 | 66 | 88 | 110 | 132 | 154 | 176 | 198 | 220 |
| **No Degradation** | 89.584 | 88.319 | 84.093 | 77.683 | 69.909 | 60.753 | 50.341 | 39.260 | 28.467 | 18.998 | 11.577 |
| **1st Order Decay** | 89.584 | 0.019 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Inst. Reaction** | 89.320 | 87.897 | 83.434 | 76.516 | 67.815 | 57.201 | 44.779 | 31.266 | 17.879 | 5.982 | 0.000 |
| *Field Data from Site* | 9.E+00 | | 8.E+00 | | | | | 5.E-01 | | | |




Calculate Animation

Next Timestep

Prev Timestep

**Time:**

*50 Years*

**Return to Input**

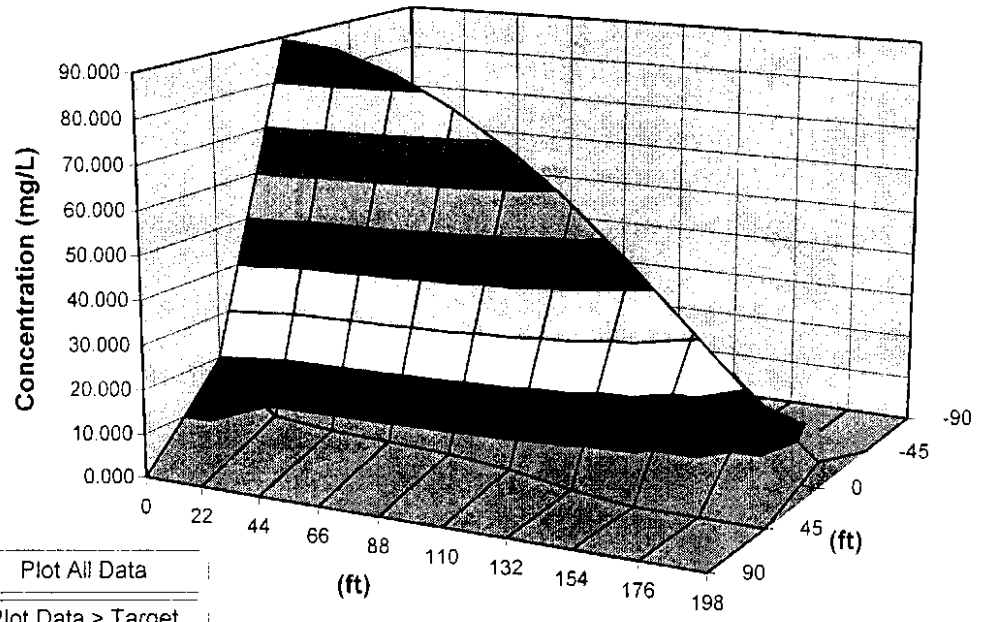
**Recalculate This Sheet**

## DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

| Transverse Distance (ft) | Distance from Source (ft) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 22 | 44 | 66 | 88 | 110 | 132 | 154 | 176 | 198 | 220 |
| 90 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| 45 | 2.E+01 | 8.E+00 | 7.E+00 | 6.E+00 | 5.E+00 | 4.E+00 | 2.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| 0 | 9.E+01 | 9.E+01 | 8.E+01 | 8.E+01 | 7.E+01 | 6.E+01 | 4.E+01 | 3.E+01 | 2.E+01 | 6.E+00 | 0.E+00 |
| -45 | 2.E+01 | 8.E+00 | 7.E+00 | 6.E+00 | 5.E+00 | 4.E+00 | 2.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| -90 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 | 0.E+00 |
| MASS FLUX (mg/day) | 2.E+03 | 2.E+03 | 2.E+03 | 2.E+03 | 2.E+03 | 2.E+03 | 1.E+03 | 7.E+02 | 4.E+02 | 1.E+02 | 0.E+00 |

Time: 50 Years  Target Level: 0.005 mg/L  Displayed Model: Inst. Reaction

Model to Display:
- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model




Plot All Data

Plot Data > Target

*Plume and Source Masses (Order-of-Magnitude Accuracy)*

| | | |
|---|---|---|
| Plume Mass if No Biodegradation | 61.8 | (Kg) |
| - Actual Plume Mass | 33.1 | (Kg) |
| = Plume Mass Removed by Biodeg | 28.7 | (Kg) (46 %) |

Change in Electron Acceptor/Byproduct Masses:

| Oxygen | Nitrate | Iron II | Sulfate | Methane | |
|---|---|---|---|---|---|
| -9.0 | -9.9 | +26.0 | -38.5 | +11.3 | (Kg) |

| | | |
|---|---|---|
| Contam. Mass in Source (t=0 Years) | 9300.0 | (Kg) |
| Contam. Mass in Source Now (t=50Years) | 9238.2 | (Kg) |
| Current Volume of Groundwater in Plume | 0.9 | (ac-ft) |
| Flowrate of Water Through Source Zone | 0.017 | (ac-ft/yr) |

*Mass HELP

Recalculate